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# Contractors and Engineers Monthly

Vol. 36, No. 6

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## Highlights Of This Issue

### • Rebuilding Old Marl Road

A 5-mile road job in Florida last summer involved the rebuilding and widening of an old marl base, surface treatment, and the construction of a number of novel drainage structures.

See page 2.

### • Mobile County Roads

Mobile County is in the unusually favorable state of having the largest paved road mileage of any county in Alabama. A report on the road work in this county appears in this issue.

See page 2.

### • Modern Clinic on Subway Job

Believing that the safety and welfare of its employees is of paramount importance in the efficient execution of a job, a New York contractor maintains an up-to-date first-aid clinic, with a trained staff, ready 24 hours a day to meet any emergencies which may arise on a difficult subway job.

See page 2.

### • Texas Highway Survey

An example of the cooperative effort of forty-six state highway departments and the U. S. Bureau of Public Roads in studying our present road facilities and traffic in order to plan for future traffic needs and road development, the work of and results secured by the Texas Highway Planning Survey are described in this issue.

See page 6.

### • Pit-Mixed Road Material

A novel method of preparing material for a road-widening job in South Carolina involved mixing the material with a road-mix machine at gravel pits and then placing the material in the widening trench by means of a belt conveyor.

See page 16.

### • Road Methods for Airports

In effecting the many improvements to the Municipal Airport, road-mix methods usually employed in the construction of highways were used by Los Angeles to provide a stabilized paved runway surface on the natural adobe subgrade.

See page 21.



C. & E. M. Photo  
Motor Mowers Cut Mowing Costs As  
Well As Grass

## Mowing Strips On Boulevards

### Methods in Massachusetts Show How Small Crew Can Maintain Many Miles of Grass Strips

• MASSACHUSETTS, like many other states, is faced with an increasing volume of work for its maintenance department due to needed roadside development projects on old highways, in order to reduce future maintenance costs. The addition of this type of work, which on current projects is considered as construction, to the regular work of the maintenance department, with a steady decrease in the maintenance budget, means that corners must be cut to effect the necessary economies to make both ends meet. The Worcester District of the Bay State Department of Public Works has shown very well how it is possible to carry on at least one phase of maintenance at the lowest possible cost. Grass cutting is a necessity for

(Continued on page 23)

## Well-Planned Forms Feature of Work on High-Level Bridge

(Photo on page 52)

• A NEW 5-span steel bridge with a concrete deck was completed last summer by Hobbs Peabody Construction Co. of Charlotte, N. C., on U. S. 19 in the middle of a heavy grading and traffic-bound macadam base contract of Nello L. Teer between Bryson City and Wesser, N. C. The bridge, built from plans and specifications of the North Carolina Highway and Public Works Commission, was financed by the Aluminum Company of America because the bridge spans the pond of a future possible hydro development which will raise the Little Tennessee River from a normal elevation of 1,522 to 1,580.

### General Design of Structure

The bridge consists of two abutments and four piers. The two end spans are of I-beam stringers, that at the west end being 45 feet 6 inches with five 24-inch wide flange I-beams weighing 87 pounds per foot and two weighing 94 pounds per foot. Span E, the corresponding end span at the east end, is 43 feet 6 1/2 inches and is similarly supported. The central span is 187 feet and the two adjacent spans, one on either side, are 186 feet long. These three central spans are trusses.

The bridge carries a 24-foot roadway and no sidewalk. The curb is 10 inches high inside and 18 inches high outside and 19 inches wide. The hand rail, carried on the curb, is 34 inches high above the top of the curb. It contains 8 x 20-inch windows forming the spindles circular at the top and chamfered 3/8-inch all around. The coping on the hand rail is 10 inches wide and flat, 6

### Hobbs Peabody Constr. Co. Completed 649-Foot Span On U. S. 19 in Western End of North Carolina

inches high and chamfered 3/4-inch on all four corners. The hand-rail panels are 13 feet long on the average and the hand-rail posts are 20 inches wide and 37 inches high.

The deck is 7 inches thick and on the end spans is thickened at the seven stringers to take care of the 1 1/2-inch crown. The deck is carried to the bottom of the top flanges of the stringers in a manner to be described in the section on the forms and concreting of the deck. Scuppers in the deck are formed of 3-inch diameter pipe 2 feet long beveled 1 3/4 inches and set with the top bevel flush with the top of the deck, thus throwing the water clear of the steel work from the bottom end of the structure 18 inches below the deck. The scuppers are spaced 6 feet apart.

The spans were lettered from A to E, starting at the west end. Span A is fixed at the abutment end, Span B is fixed at the first pier, Spans C and D are free at the second pier with a 3-inch open expansion joint covered with a checkered steel plate 3/4-inch thick and 12 inches wide held in place by eighteen 3/4-inch rods on 16-inch centers and with octagonal plates set against the under part of the deck and held firmly with lock nuts. Span C is fixed at the third pier, Span D is fixed at the fourth pier and Span E is fixed at the east abutment. The east abutment is slightly skewed, 20 degrees, and the last span is skewed to fit.

The I-beam stringers for the end spans have stiffener channels riveted to angles riveted to the I-beams. The steel work was furnished and erected by the Virginia Bridge Co. under a subcontract and was executed between August 21, 1937 and December 1, 1937.

### The River Pier, No. 3

Only one of the four piers is in the river and thus the actual construction of the foundations was greatly simplified. The footing for Pier 3 is 30 x 12 feet and 2 feet 6 inches deep. It rests on solid rock in the river bed. Wakefield wood sheet piling was driven in two lines spaced 6 feet apart and filled with clay to form the cofferdam. The inside dimensions of the coffer were 35 x 17 feet. The cofferdam was pumped out with Novo self-priming pumps and then the rock excavated 12 inches with Sullivan pneumatic equipment, the rock cleaned and the footing poured, fol-

(Continued on page 10)



C. & E. M. Photo  
Machine-Mixing the Material for the New Runways at the Los Angeles Municipal Airport. See Page 21.

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# Old Florida Marl Road Base Rebuilt, Surface Treated

**H. E. Wolfe Construction Co. Completes 5-Mile Project at Labelle, Fla., Novel Bridges And Unusual Pump at Pits**

(Photos on page 52)

♦ MARL, a lime carbonate, is not an easy material to handle when wet because it becomes spongy and will not compact well under rollers. It is therefore necessary to keep marl borrow pits dry if the contractor is to speed the work. On its 5.063-mile marl base and surface treatment project on Florida 164 south of Labelle, the H. E. Wolfe Construction Co. of St. Augustine, Fla., borrowed a leaf from the book of a local tomato planter and replaced four conventional triplex pumps, which had failed to keep the water down, with a propeller pump built on the job.

The pump consisted of two 4-blade propellers mounted on a shaft with two marine bearings inside a 12-inch vertical pipe about 12 feet long, with a right-angle elbow 15 inches square at the top acting as the discharge line. The rear end of an old Ford truck was mounted at the end of the shaft for a drive, with an old Chevrolet motor attached to the end of the axle for power. This unit moved water freely from the pit with the 11-foot lift and the two propellers kept the discharge line flowing half full all the time. The dragline was able to excavate the marl in the dry from the upper ends of the pit at all times.

## Bridges

When this work was first laid out in the field there was 2 feet of water over the entire country, rather a discouraging condition for a contractor to face. The entire section drains to the Catosa-hatchee River north of Labelle, requiring an abundance of drainage structures on the project. If pipe culverts had been chosen for the cross drainage they would have quickly filled with sand as they would have required a full 12 inches of cover beneath the 6-inch minimum base. The type of bridge chosen has the advantage of a large opening with a shallow depth. Seven of these concrete bridges of 15-foot spans and carrying a 24-foot roadway were built on this one project. They are common in Florida construction.

Work on the bridges was started November 15, 1937, ahead of work on the marl base. The bridges have 3-foot 6-inch footings 1 foot thick and the wall carried on the footing is 12 inches thick. The wing walls are run at 45 degrees to the walls and the only difference in the two types of bridges built on this project is the depth of the wing walls which are slightly longer and deeper on three of the bridges. The roadway slab is flat, measuring 1 foot 2 inches thick at the center, and has a 1½-inch parabolic crown. The side curbs are 9 inches high and 12 inches wide, with a 1-inch batter on the inside, and two 2 x 10-inch scuppers on each side. There are no hand rails but instead a heavy guard rail post is set at either end of the curb and a 16-foot section of metal guard rail is set in between.

A ¼-inch expansion joint was set between the sides of the road slab and the abutments and the road slab was poured separate from the abutments but with no separating paper or fabric other than the natural construction joint. The bridge quantities were:

QUANTITIES		
Class A Concrete (91:200:308)	Larger Type 48.1 cu.yd.	Smaller Type 41.6 cu.yd.
Reinforcing steel	4,330 pounds	3,930 pounds

## The Marl Borrow Pits

The state selected two borrow pits for the marl, one located near the north end of the job and the other just south of the project. This procedure cut the overhauling item on the contract. When the north borrow pit, measuring about 250 x 150 feet, was opened, the top 700 cubic yards from the first section of the pit was used for dressing the shoulders and then the marl was removed to a depth of about 6 feet and hauled to the road. The second section was stripped and the top material dumped into the first section and similarly the top portion of the third section was wasted into the second section of the excavation. The pump described above was used in this

and the south pit to keep the water below the excavation grade. All of the overburden from the south pit was used on the road. The contractor was paid for the material in place in the pit so frequent cross-sections were run on the pits. Because of the difficulty in getting marl to dry out, the contractor hauled the marl the maximum distance from each pit first so that it was unnecessary to haul through it.

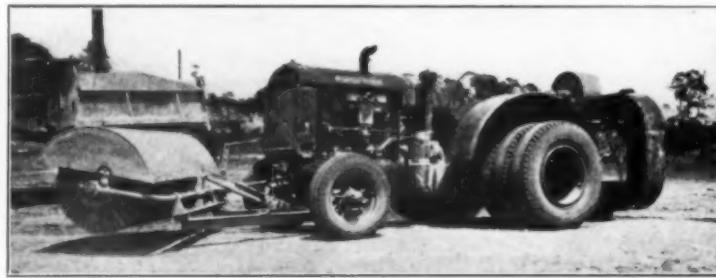
There were some hard strata in the marl pits that had to be broken up by shooting before the dragline could handle them, loading out to the trucks.

## The Marl Base

The old marl base on this road was 16 feet wide and varied in thickness from 2 to 6 inches. It had been given no treatment and was very dusty or very slippery, depending on the weather. This project widened the road to 20 feet with two 5-foot shoulders and a crown of ¼-inch per foot for the road surface when finished. The old base was scarified and new marl added to give a minimum 6-inch base, using a Caterpillar Sixty and an Austin scarifier.

Form boards of 2 x 10-inch lumber were set along the edges of the new base in a trench prepared by setting the

(Concluded on page 29)



C. & E. M. Photo  
She Sweeps, She Rolls, She Blows—an International Tractor with Triple Pneumatics, a Detroit Harvester Rotary Broom, and a Blower

## First-Aid Field Clinic On Subway Contract

### Service Is Available to Workers 24 Hours Daily; Job Also Has a Modern Hospital Lock

(Photo on page 52)

♦ COMPENSATION insurance ameliorates the financial losses due to accidents occurring on construction work, but nothing can compensate the workman for the pain of minor injuries which become serious through the lack of immediate medical treatment. In order to protect its staff of more than 600 engineers, superintendents, foremen and laborers from lost time because of injury, Spencer, White & Prentis, contractor for Section 6 of the new Sixth Avenue subway, New York City, installed a complete first-aid clinic adjacent to the shaft at the northeast corner of Waverly Place and Sixth Avenue. Also, close to the hog house on the mezzanine of the Fourth Street subway station is a hospital lock for treating compressed-air illnesses.

## The Building

The clinic is a 26 x 16-foot one-story steel-frame structure, with fireproof insulating board inside and with the outer walls and roof of corrugated iron. It contains eight large windows with shades and curtains providing ample sunlight and an attractive interior, and is also equipped with adequate electric lighting for dull days and the night work. Steam heat is provided by an insulated line from the adjacent shaft field office.

The building contains an examination and treatment room measuring 12 x 8 feet, with a hospital cot, a small dressing room 5 x 8 feet with a lavatory, a large dressing room 7 x 8 feet which is an alcove readily screened off from the outer office and waiting room, which measures 14 x 16 feet. The equipment provided by the physicians who staff the Clinic makes it possible to take care of all emergency and first-aid cases.

Every sand hog is examined before he is employed and every visitor must undergo the same complete examination before he is admitted to air. This includes a thorough examination of the heart and lungs, the blood pressure, urine, an examination of the ear drums,

(Concluded on page 14)

## Report on Roads In Mobile County

### Coastal County in Alabama Has Largest Mileage of Paved Roads in State; New Bridge Would Be Big Boon

♦ IN a recent interview Donald L. Smith, Engineer for Mobile County in southern Alabama, pointed out the unusually favorable condition in which the county finds itself with regard to the mileage of paved roads. Within its 1,200 square miles Mobile County has close to 1,000 miles of roads under county jurisdiction. Of these, 175 miles are paved with concrete, 50 miles have a double surface bituminous treatment, 25 miles are surfaced with a cold-mix cold-laid bituminous material, 150 miles are gravelled and 600 miles are maintained regularly.

County roads are financed by money from the division of the state gas tax of 6 cents per gallon, of which the counties get 3 cents. This total sum is divided into 67 equal parts and given to the 67 counties. Mobile County, as one of the recipients, gets about \$100,000 a year from this source to finance all road construction and maintenance. There is also a 5-mill ad valorem tax on real estate in the county which provides the money for the sinking fund for the \$5,000,000 bond issue which resulted at the end of 1931 in the county having the largest paved mileage in the state. There is also a 2½-mill ad valorem tax on real estate which is used for the purchase of new construction and maintenance equipment, for maintenance of roads and for interest on the outstanding road and bridge bonds, a large portion of the school bonds and public building bonds.

The county is divided into three districts with Revenue and Road Commissioners elected from each district. Three are elected from District 1 which is the City of Mobile and one each from the north and south sections of the county. In addition to the County Engineer who has supervision over the construction in the county, there is a Superintendent of Maintenance. This Superintendent has at his disposal all the equipment owned by the county, including the construction equipment when necessary. This fleet includes: 26 trucks, including 4 Dodges, 10 Chevrolets, 8 Fords and 4 Internationals; two Galion diesel motor patrols; one International T40 tractor; one Cletrac tractor; eight I-30 International tractors for hauling graders; and ten Galion and Austin-Western graders.

## Large Betterment Program

At the present time the county has a large betterment program under way

(Concluded on page 35)



A Corner of the First-Aid Clinic on the Spencer White & Prentis Subway Job

# About to become an all-weather road



Just a few years ago, millions of Americans still lived on unsurfaced roads, alternating between dust and mud. Small mileages of hard-surface paving annually monopolized highway dollars and relief for these millions seemed a long way off.

Then came the swiftly rising popularity of low-cost Asphalt surfaces, one type of which is pictured above.

Note how the blade grader thoroughly mixes inexpensive local aggregate and a

slow-curing TEXACO Asphalt Surfacing Material. When spread evenly over the road and compacted, this mix becomes a tight, water-shedding, all-weather surface, two or more inches thick.

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## Superhighways Not Needed, Bureau Proposes a Master Plan

The report of the Bureau of Public Roads to Congress on "Toll Roads and Free Roads" was sent to Congress on April 27. While granting the feasibility of a system of toll highways—three generally north and south and three trans-continental—from a physical standpoint, the report shows that such a system would be less than 50 per cent self-supporting. The type of toll roads which Section 13 of the Federal Aid Highway Act of 1938 required the Bureau to report on does not meet the most urgent highway needs of the country. Therefore the Bureau offers a master plan which it believes will meet these needs.

This master plan of free highway development makes a frontal attack on the congestion and delays existing on main arteries in cities by proposing the construction of express highways through cities, belt-line routes around them, and the by-passing of small cities. It further proposes the creation of a national system of inter-regional highways, 26,700 miles in all, by modernizing existing main travel routes and building new routes to make travel more direct.

The information gathered by the State Highway Planning Surveys indicates a real need for improvement of a carefully selected mileage of secondary and feeder roads to give direct service to a larger number of rural dwellers. This selection would be made from the 2,650,000 miles of roads, outside the state and Federal-Aid systems, which constitute 78 per cent of the country's total road and street mileage, but serve at present only 10 per cent of the total vehicle mileage. The homes of 75 per cent of the rural population are located on these roads and their improvement will afford better access to rural property.

The report emphasizes statements made by Thomas H. MacDonald, Chief of the Bureau of Public Roads, at the Highway Research Board meeting last December that superhighways more than 50 miles from metropolitan areas are uneconomical, except in isolated cases. Traffic maps in the report show that 90 per cent of the traffic on main highways near large cities is headed to or from points in the cities themselves and therefore can not be by-passed around the cities. It shows also that a large part of the traffic is moving to the heart of the city or to points most easily reached by passing through it.

The obvious solution of this is the express highway through the center of the city, serving both through and intra-city traffic. Examples of this facility are the West Side Highway and Henry Hudson Parkway in New York and the new express highway in St. Louis. The report emphasizes that such express highways should be attractively landscaped depressed thoroughfares passing under

all cross streets.

The Bureau studies have shown the error of the belief that by-passes are the only solution of congestion in city streets. By-passes are recommended around smaller towns, and a new type of belt-line distribution road around cities is proposed. Parking and cross traffic must be prohibited on both types of highway, and building developments immediately adjacent must be controlled or the initial advantage of such highways will be lost and they will become merely local streets.

The report also stresses the need for further modernization of existing roads to reduce curvature and gradients, and extend sight distances to serve fast-moving traffic more effectively. Near cities an increasing mileage of four-lane highways is needed.

A radical recommendation for the creation of another Federal Bureau, a Federal Land Authority is made, to take over the acquisition of land through adequate Federal financing on the theory that it will be wholly or partially self-liquidating through excess condemnation of low-value lands which will increase in value when the highway, slum-clearance or other public project is completed, and then the excess lands sold to pay for the improvement. It is claimed that this will eliminate the great delays now retarding many needed public works.

This is a valuable proposal in making the construction of express highways possible. Such a method was used by two New York City Departments in the extension of Church Street and met with general acclaim, but the popularity of the creation of another Federal Bureau with demands for more funds, and pos-

## Roadside Development Awards Commended

To the Editor

CONTRACTORS AND ENGINEERS MONTHLY

It is very gratifying to learn of your recent announcement concerning plans for a series of Sectional and National Annual Awards to be made by CONTRACTORS AND ENGINEERS MONTHLY to stimulate greater interest in roadside development among contractors.

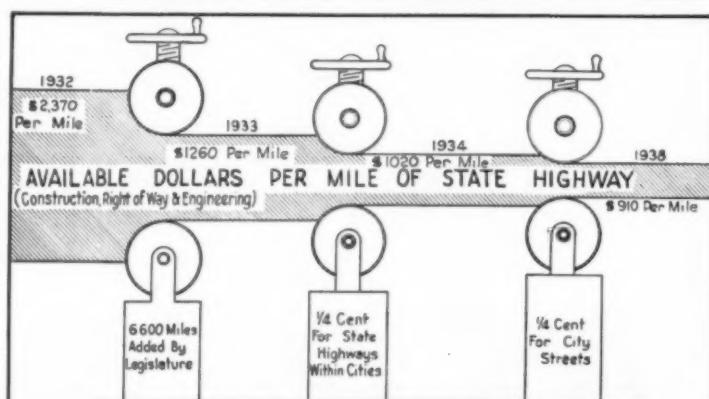
The Bureau recognized the need for improvement of the condition of the roadsides many years ago and was instrumental in securing an amendment to the Federal Highway Act (45 Stat. 683 approved May 21, 1928) which permitted Federal aid in the planting of shade trees as part of highway improvement. However, very little was actually accomplished under such provision as almost no projects included any tree planting. As you may recall, required roadside improvement work along main highways had its beginning about six years ago. At that time, the rules and regulations, as covered in my memorandum under date of June 30, 1933, addressed to district engineers of the Bureau of Public Roads, required that each State highway department include in its program of construction on the Federal-aid highway system a definite number of projects that will provide for the appropriate landscaping of parkways or roadsides. It was necessary for the Bureau to make this new phase of road work a mandatory part of highway improvement programs so as to bring about in all States a number of demonstrations of the possibility of pleasing roadside treatment at moderate cost and to develop methods and organizations that will be necessary to carry on similar work on an extensive mileage in the future.

Looking back over these years of roadside experience by each State highway department, we can now see that a sound foundation has been laid for a field of work that at the time of its inception was almost undeveloped, but which today has tremendous possibilities

sibly dominated by some well-meaning but visionary political appointee, is somewhat doubtful.

If this new bureau can and will be staffed with practical trained men, free of political entanglements and favoritism, to operate such a bureau as a business enterprise, the idea should work. We know that this is not expecting the impossible—the Bureau of Public Roads is an example of an efficient government unit carried on by men of practical training and loyalty to ideals. It is essential that this new Land Authority, if it comes into existence, be organized along these lines, if the taxpayer is to reap the benefit.

### A SQUEEZE PLAY WITH HIGHWAY FUNDS



California State Highway Gas-Tax Funds Go Through the Rolling Mill. These Figures Are Those Derived from Funds Available from the 3-Cent Per Gallon Gas Tax After Deductions for Maintenance and 1 Cent for Counties. (Taken from California Highways and Public Works)



"Yeah, and Come Fourth of July We Won't Even Let Me Play with Fire-crackers!"

because it is so much better and more widely understood. In your own active travels as an editor, you have no doubt found in the last year or two many signs of increasing interest in roadside development among construction engineers in the State highway departments who have now had opportunity to observe the economic advantages of reduced erosion and lower maintenance cost of improved roadsides, as well as their esthetic value.

With the pioneering phase of roadside experience in the background, much improvement in methods and practice can be expected. There is no question that the educational information that appears in highway magazines from time to time has contributed its part to the rapid development of this relatively new highway subject. The Roadside Development Awards by CONTRACTORS AND ENGINEERS MONTHLY should stimulate greater interest in roadside development on the part of State highway department officials and engineers as well as among contractors.

Your magazine is to be commended for initiating and sponsoring such a definite series of awards which should appeal to every highway engineer and contractor over the nation who takes pride in his work.

I wish your program every success in directing greater emphasis upon the landscape development of highways because the task of improving America's highways will not be completed until adequate attention has been given to the improvement of the roadsides as well as the roadways.

Very truly yours,  
Thomas H. MacDonald, Chief,  
U. S. Bureau of Public Roads,  
Washington, D. C.,  
May 16, 1939.

## Vacation Approaches—Guard Blasting Caps

Annual statistics show that beginning in the spring of each year accidents to children playing with blasting caps increase until a peak is reached in July and August. During the years 1934 to 1937 records showed a steady reduction in the number of these accidents. Unfortunately, there was a slight increase in 1938.

We urge contractors to guard blasting caps more carefully than ever before so that there will be no opportunity for them to fall into the hands of children or others who, not knowing their dangerous character, can be badly injured by playing or tampering with them. Since construction projects, and quarries, are the major sources of blasting caps in any community, we ask contractors and quarrymen particularly to urge greater care on the part of employers in collecting all blasting caps at noon and night and placing them under lock and key on the job. Carelessness in leaving them around following blasting operations, or workers carrying them home and leaving them in cupboards and barns may result in fatal injuries to innocent parties. Safeguard lives and property by guarding blasting caps.

### England Tries Glass Curbs As Night Safety Measure

Glass curbs to mark the roadside are being tried out on 15 miles of roads in Essex and Leicestershire, England, as a safety measure for driving at night or in fog, according to a recent issue of *Roads and Road Construction*, London. These new curbs, it is claimed, are easier to see than a white painted curb, and eliminate the necessity of frequent repainting.

Experiments were carried on by a Leicestershire stone and quarry firm which finally produced a new type of concrete curb in the side of which are

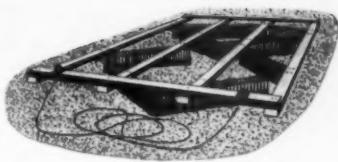
fitted panels of white vitrolite, a durable opaque glass with excellent reflective qualities. This new curbing seems to be very successful in marking the sides of the road clearly, adding to the safety of night driving.

### New Wire Brush Plane For D.B.S.T. Surface

A new road plane for medium-heavy or light surface treatment of oiled roads, for the manipulation of chips on penetration macadam, and for D.B.S.T. work, has been announced by Good Roads Machinery Corp., Kennett Square, Pa. The

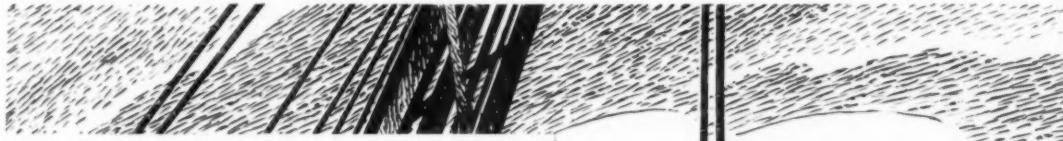
round 18-gage 60-70 carbon basic spring steel brushes are arranged in four related pairs, giving lateral and longitudinal mixing and leveling movement of the material entirely within the width of the plane. This Good Roads road plane does not leave a windrow but levels out all material.

The frame is made of four pieces of 2 x 4-inch x 14-foot timbers and two pieces 2 x 6 inches x 7 feet long bolted together with  $\frac{3}{8}$ -inch carriage bolts. Spruce wood is used to give the greatest strength and least weight. The road plane is pulled by a  $\frac{1}{4}$ -inch flexible steel cable 25 feet long, equipped with a ring for coupling to a tractor or truck.



The New Good Roads Road Plane

The shipping weight of the machine, which is delivered knocked down, is about 420 pounds. Further information and prices may be secured direct from the manufacturer by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.



## WIRE ROPE IS THE LIFE-LINE ON YOUR BUCKETS—

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helps you protect life and your investment*



Good wire rope is good insurance against costly breakdowns, delays and injuries. And good rope — rope that lasts and gives long, safe, economical service — must be formed with precision from wire drawn from the finest steel.

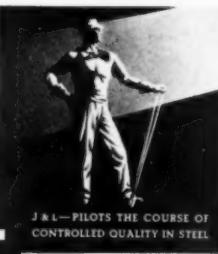
In Gilmore Precisionbilt Wire Rope — made from J & L Controlled Quality Steel — you get this combination of security and service. For the quality of J & L Steel is controlled from the grading of the iron ores to the drawing of the steel wire. And this quality-controlled wire is formed into Gilmore Rope on the latest type of machines — in the country's most modern wire-rope plant — by skilled men who work with the knowledge that sometime in the life of every rope they make, human life may depend upon its performance.

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# Survey of Highways In Lone Star State

## Highway Planning Survey Covers Traffic, Condition, Types and Life of Roads, And All Taxing Units

• A MOST important cooperative effort is now actively engaging the attention of the state highway departments of forty-six states and the United States Bureau of Public Roads. Believing that Texas with its 200,000 miles of roads that can be used by motor vehicles would provide an interesting sample of methods and results, we interviewed F. Thayer Stoddard, Manager of the Texas Highway Planning Survey for the Bureau of Public Roads. Mr. Stoddard has directed his enthusiasm and interest to this work as he has for many years followed the construction of Federal-Aid roads in the southwest where we had met him many times in the past. He spoke most highly of the work being done by the Texas Highway Department in this survey under the direction of G. G. Edwards, State Manager, and of the progress that has been made in 32 months.

The survey in Texas has been divided into four main divisions: Traffic Survey; Road Inventory; Road Life Study; and Financial Survey. The slightly different approach to these problems and the subdivisions of the work make the Texas Survey of particular interest.

### Traffic Survey

A traffic survey was conducted on every mile of road over which motor vehicles can travel on the state highway system and the secondary systems of the 254 counties. This work was done by twenty automatic recorders of the 2-eye type permanently installed at strategic points on eighteen main highways and two on county, farm-to-market or feeder roads, in addition to extensive field counts done manually on definite schedules.

The Texas Highway Department has developed its own counter that records the number of vehicles passing a given point on a film, giving a permanent record. It is expected that between 30 and 40 of these counters will be built and rotated on schedules over the state to keep the traffic data current, to study the present sampling methods with a view to developing more economical schedules, and to make special counts from time to time to determine the extent of traffic fluctuation at specific locations.

### Trucks Weighed and Measured

By the use of Loadometers the Survey has studied the weights of the various vehicles that are using the state highways. In most states the Loadometer studies cover only the weighing of the axle loads on one side, and separate pit-scale studies cover the weighing of the pairs of wheels of the vehicle from front to back, the measuring of the overall height, length and width, and determining the origin and destination of the load, the axle spacing and size of tires. In Texas the Loadometer study included these other features of the pit-scale studies so that, except for the slight inaccuracy of weighing only one side of the truck one axle at a time, these studies were comparable to the more complete pit-scale studies in other states.

There was a total of 179,984 weighings during 1,968 operations at 124 selected stations in the state in 12 months or 14 cycles. Each of the stations was operated once for each day shift for each day of the week to give fair and complete sampling. The day shifts were 6 a.m. to 2 p.m., 2 p.m. to 10 p.m.,

and a night shift from 10 p.m. to 6 a.m. operated at 37 stations only. The cost of the weighing was 47.50 cents per truck, or \$43.40 per 8-hour weighing and measuring operation with five men in the party. The total cost of the 179,984 weighings was \$85,553.39. The largest gross load encountered was 60,000 pounds, a tandem-drive tractor truck with tandem semi-trailer carrying heavy oil-field equipment under a special permit.

Some of the unusual loads which were recorded at the stations were: a truck-load of game cocks from New Orleans bound for Dallas; a truck of racing automobiles from Indianapolis for Los Angeles; a school bus loaded with hogs; two trucks of honey bees from Texas

(Continued on page 36)



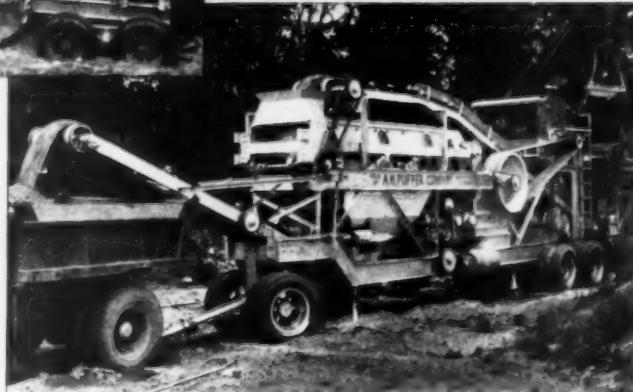
Temperatures as Low as 38 Degrees Below Zero at an 8000-Foot Elevation Were the Conditions Under Which This Northwest Shovel and Ford V-8 Worked on a Road Job Between Floyd Hill and Black Hawk, Colo., for Which U. S. Siegrist of Denver Was the Contractor. The Ford, Equipped with a 95-Hp Engine, 2-Speed Axle and Special Body, Hauled 5 Yards of Gravel Per 18-Mile Trip from Gravel Pit to the Job, Over Grades Up to 8 Per Cent.

## ROAD MACHINERY BUILDER SHOWS...

HOW TO MEET  
CONSTRUCTION  
SCHEDULES



Portable crushing and screening plants built by Iowa Manufacturing Company, Cedar Rapids, Iowa. They also build jaw crushers, conveyors, asphalt plants...and recommend Texaco lubrication.



THE IOWA MANUFACTURING COMPANY builds portable crushing and screening plants that are marvels of ingenuity.

When this equipment leaves the Iowa factory, it is lubricated with Texaco, and the builder recommends that users continue to use Texaco. Iowa specifically recommends Texaco Marfak, Texaco Industrial Oils, Insulated Texaco Motor Oil, Texaco Crater Compound.

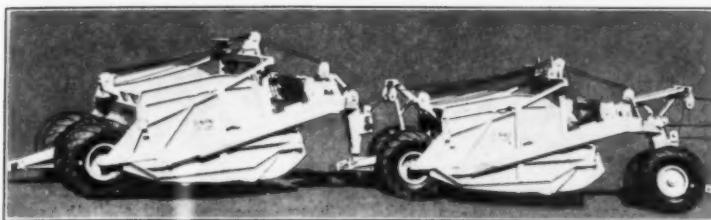
Experienced Texaco engineers will be glad to demonstrate that savings can be made with Texaco Industrial Lubricants. For prompt engineering service or deliveries, phone the nearest of our 2229 warehouses or write:

The Texas Company, 135 East 42nd Street, New York City.

Texaco Dealers invite you to tune in The Texaco Star Theatre—a full hour of all-star entertainment—Every Wednesday Night—Columbia Network—9 E.D.T., 8 E.S.T., 8 C.D.T., 7 C.S.T., 6 M.S.T., 5 P.S.T.



# TEXACO MARFAK



A Pair of Wooldridge Terra-Clippers, Showing the Tandem Hitch

## New Dirt-Moving Unit In 18-28 Yard Models

Built for use on large dirt-moving jobs, the Wooldridge Terra-Clipper scrapers recently announced by the Wooldridge Co., Sunnyvale, Calif., are available in 18, 22, 24 and 28-yard models which may be used singly or in tandem. Sturdy compact design and all-welded steel construction have cut dead weight to a minimum without sacrifice of strength, according to the manufacturer.

One of the features of these scrapers is the new tandem hook-up to make a close-coupled rigidly connected tandem unit which handles easily, will not jackknife on down grades, and makes fast short-radius turns. The front truck of the scraper is removable to permit the draft-yoke gooseneck of the trailing scraper to mount directly on a forged ball connection carried on the booster bracket of the leading Terra-Clipper.

Power from the tractor engine is transmitted through the Wooldridge power control unit directly to the drum winch driving shaft by means of a heavy heat-treated steel worm and special bronze worm gear. Anti-friction ball and roller bearings are used throughout, and all gearing is fully enclosed and runs in oil. Each drum drive operates through a positive fast-acting self-aligning cone clutch. A heavy-duty oversize external brake on each drum is controlled by a special toggle action which stops and holds fast-running heavily loaded cables because the tighter the pull, the greater the braking pressure exerted by this control. The winch drum is ventilated and ample cone surfaces are exposed to the air to assure adequate cooling under all conditions.

Literature describing and illustrating these cable-controlled Terra-Clipper scrapers and Wooldridge power control units may be secured by those interested direct from the manufacturer by mentioning this item, or from this magazine.

## Mower Cutter Raised And Lowered by Power

The new Case-Detroit highway mower has both power-lift and power-lower of the cutter bar and the sickle cuts a full stroke at all angles. The cutter bar on this machine, which is sold by J. I. Case Co., Racine, Wis., is mounted ahead of the rear drive wheel on Case R, RI, and CI tractors, so that the operator has full control of it at all times and can easily see obstructions.

All of the fast-moving shafts are equipped with ball bearings and the power box is completely enclosed and operates in oil. A safety release which "breaks back," protecting both the tractor and the mower, is another feature

of this new mower.

The cutter bar can be lowered to a maximum of 45 degrees down or 90 degrees up without disengaging the sickle drive. Time studies indicate that in an average day's highway mowing, the cutter bar must often be raised or lowered 500 or more times to follow the contour of the ground, to dodge mail box posts, guard rail posts, bridge or culvert sides and other obstructions. The mower can be had with a 5-foot or 6-foot cutter bar mounted on standard tread tractors.

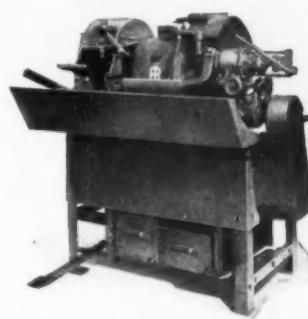
## New Grinder for Bits

A new semi-automatic high-production Jackbit grinder has just been announced by the Ingersoll-Rand Co., 11 Broadway, New York City. Known as the J-5, this one-man machine is capable of increasing production to sixty average hard bits or one hundred average annealed bits per hour, according to the manufacturer. Gaging is done automatically while the operator is forming the face of the bit.

Detailed information on this new machine, which is adaptable for use with all standard detachable rock-drill bits, is contained in a new 8-page bulletin, Form 2534, copies of which may be secured direct from the manufacturer or from CONTRACTORS AND ENGINEERS MONTHLY.

## Cold-Laid Plant-Mix Spec

The Asphalt Institute, 801 Second Ave., New York City, has recently issued



The New I-R Jackbit Grinder

three construction specifications for cold-laid asphaltic plant-mix surface courses, of the primed macadam aggregate type, the macadam aggregate type, and dense graded aggregate type. Single copies of each of these specifications will be forwarded immediately to those writing to The Asphalt Institute.

# NOW! BE THE WINNING BIDDER FOR PROFITABLE JOBS LIKE THIS



## WITH REX MOTO-MIXERS

There's no money in it for you if you're forced, by a too-high bid, to sit back and watch the other fellow get the concrete job you wanted. But the chances are that you'd be the one to get the job and the profits if you'd figured the cost of mixing, hauling and placing the con-

crete with Rex Moto-Mixers. For with Moto-Mixers' dependable, low-cost performance as a basis, you can keep your bidding figures low—and have confidence in Moto-Mixers' ability to see the job through at the estimated cost.

## THE ONLY TRUCK MIXERS WITH THESE 4 VITAL FEATURES!

★ **REX FLEXIBLE CHAIN DRIVES** — Positive, shock-and-twist-absorbing, acknowledged the most efficient means of transferring power to heavily loaded mixing drums. Lighter than gear-type drives, saves wear and tear on mixer and truck.

★ **REX SINGLE CONE-END MIXING DRUM** — Facilitates rapid loading; reverses flow of materials, giving natural end-to-end action for fast, thorough mix; simple drum blading for better mixing, cleaner drums.

★ **REX NO-FLOOD WATER TANK** — Eliminates chance for error—measures the exact amount of water for each batch, draining off the surplus. No excess mixing water is carried on the truck, weight is saved, spoiled batches are prevented.

★ **REX LOW LOAD CENTER AND LIGHT WEIGHT** — Moto-Mixers are several hundred pounds lighter than other mixers of their size—can haul a larger payload with a given gross load weight! Yet they are better balanced, easier to handle, built for longer years of service.

## SAND'S-STEVENS Line & Surface LEVEL

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Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

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## MOTO-MIXERS

SEND TODAY for your copy of the book "Payloads" which gives detailed descriptions of all of Moto-Mixers' many exclusive design features. See how they can help you outbid the field! Use this coupon.

CHAIN BELT COMPANY  
1066 W. Bruce St., Milwaukee, Wis.

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The Buckeye-Emsco Bulldozer

### Four Emsco Products Now Made by Buckeye

Four equipment units, including bulldozers, trailbuilders, rippers and power control units, formerly manufactured on the Pacific Coast by the Emsco Derrick & Equipment Co., 6811 South Alameda St., Los Angeles, Calif., are now manufactured and distributed exclusively by the Buckeye Traction Ditcher Co., Findlay, Ohio, under the trade name Buckeye-Emsco. Buckeye has announced that this change is now in effect. Buckeye has manufactured and sold these units for several months for distribution east of the Rockies.

The machines will be manufactured at Findlay, Ohio, only, and all sales will be handled through the regular Buckeye sales organization, both domestic and export. The manufacturing facilities of Buckeye Traction Ditcher Co., which have been developed in building its line of ditching and trenching machines and backfillers, convertible excavators with vacuum control, surface material spreaders, highway widening machines and R-B Finegraders, will be used to manufacture the Emsco line.

### Road Maintainers

Two pieces of literature describing equipment for maintaining gravel and low-cost bituminous roads and for building and maintaining road shoulders are issued by the Burch Corp., Crestline, Ohio. The Burch Undr-Truk road maintainer, built in three sizes for varying sizes of trucks, can be attached or detached to the truck in 5 minutes, according to the manufacturer, and is equipped with gear or hydraulic control.

The shoulder builder and maintainer is attached to the side of a truck. The blades are raised and lowered by means of a double acting hydraulic ram mounted in the maintainer frame and operated by a pump installed in the truck cab. It is claimed that a truck equipped with one of these maintainers, traveling at a speed of from 6 to 12 miles an hour, depending on the condition of the shoulder, can average from 25 to 50 miles of thoroughly worked road each day, working the shoulder on both sides, one trip each way.

Copies of Bulletin U.T.M. No. 3, describing and illustrating the Burch Undr-Truk road maintainer, and Bulletin S.M. No. 5 on the Side-o-Truck shoulder builder and maintainer may be

secured by interested state and county highway engineers direct from the manufacturer by mentioning this item.

### New Novel Crusher Folder

A new 12-page thumb-tabbed folder, No. SF-30, has been prepared by the Universal Crusher Co., Cedar Rapids, Iowa, picturing and discussing its new line of weight-saving streamlined portable crushing units, as well as many types of stationary and portable plants. Copies are available free to those writing direct to the manufacturer and mentioning this item.

### Moved to New York Office

R. W. Eichenberger, Vice-President. Robins Conveying Belt Co., formerly acting as Manager of its Chicago office, has been transferred to the New York City office at 15 Park Row, where he will collaborate in general sales management for the Company with H. Von Thaden, Vice-President.

### Don't Forget These Figures

The U. S. Bureau of Public Roads is the authority for the statement that an expenditure of \$100,000,000 for highways results in an average annual employment of 102,690 persons continuously employed for twelve months at an average yearly wage of \$970. This same expenditure, meanwhile, generates an economic movement which eventually involves, in the handling and processing of materials by industry, a total value of business approximating \$315,000,000.

Further, one out of every seven persons gainfully employed in the United States in normal times is at work on the highways, or in the highway and automotive industry. From 85 to 90 cents of every dollar expended for road construction goes to the worker.

For every dollar spent for this purpose there will be a profit dollar not only for the worker, but also for every citizen of this country.

Murray D. Van Wagner, Michigan State Highway Commissioner; President, American Road Builders' Association.

### A New Line of Light Portable Compressors

Among the features of the completely new line of portable air compressors recently announced by the Sullivan Machinery Co., Michigan City, Ind., are compact construction, self starters and refinement of other details to provide mobility and ease of operation. These compressors, known as the Zeph-Air, have capacity to operate concrete breakers and rock drills, yet they are so small and compact that the two-wheel mountings can be towed by a pleasure car and the skid-mounted models can be mounted in the body of standard pick-up trucks. Two sizes are available, one with a capacity of 60 and the other of 85 cubic feet per minute of delivered air.

Complete information on the Zeph-Air is contained in Bulletin A-24, copies of which can be secured by those interested direct from the manufacturer, or from this magazine.

*Want information? Write the Editor.*

**Independent CHAIN CROWD**  
NOW AVAILABLE ON IMPROVED  
**3/4 YD. LORAIN-40A**

• Here's independent power application to—and independent control of—crowding, hoisting, retracting... Crowd the dipper deep into the bank, when and how you want to, to rip through the toughest going! Ram the dipper right out beyond and above the boom point for high lift digging or hold it there to load trucks on top... You can do any of these singly, whenever needed... or you can combine crowding, as required, with high-speed powerful hoisting to obtain the smooth, fast, powerful digging cycles that enable the  $\frac{3}{4}$ -yd. Lorain-40A to

**"MOVE MORE MATERIAL, FASTER, AT LOWER COST."**

Write today for a catalog describing this newest of the Lorain-40A's many money-making features... plus its many other up-to-the-minute improvements.

THE THEW SHOVEL COMPANY  
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**TAKE YOUR CHOICE**

The  $\frac{3}{4}$ -yd. Lorain-40A is also available with the Standard

Rope Crowd—a simplified, dependable, all-cable crowding mechanism which has proved its speed and efficiency on hundreds of jobs in all kinds of digging.

### RENT a New "Simplified" ARC WELDER



No labor lost,  
no expensive re-  
placement parts. Make re-  
pairs right on  
the job... use the  
economical new  
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**HOBART WELDERS**

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Repair Equipment on the job	Get Low Cost Construction	Build Steel Forms Economically
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The Burch Wire Rope Cutter

**Wire Rope Cutter**

The Burch patented wire rope cutter, made by the A. Leschen & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo., is designed to solve the problem of cutting wire rope quickly, cleanly and inexpensively without involving heavy or expensive equipment. This cutter will handle all grades and sizes of wire hoisting ropes, haulage ropes, etc., up to and including 1-inch in diameter. No adjustment is necessary for different sizes of ropes.

The body and base castings of the Burch cutter are molded of high grade steel and are guaranteed not to break. The cutter blade and lower cutting die are made of high-carbon tool steel. The stem of the body casting is made to fit the hardy hole of an anvil as well as its own base plate. The dies have two cutting edges, so that when the edge on one side is dulled it can be reversed.

A folder describing and illustrating the Burch wire rope cutter may be secured direct from the manufacturer or from this magazine.

**Spark-Diesel Engine  
For Shovel Service**

A new versatile spark-diesel engine, in which the power output is good for its size and weight, has been announced by Waukesha Motor Co., Waukesha, Wis. This engine has already found a place in the shovel and excavator field and since it is less expensive than some of the lower-speed engines it is of particular interest to contractors. This Waukesha-Hesselman engine was originally intended for portable oil field rigs and, in a light-weight aluminum crankcase variation, for automotive service.

This oil engine is a 6-cylinder unit in two sizes of 170 and 200 horsepower. They are especially suited for use with 1 1/4 to 2-yard shovels, draglines, cranes, rock crushers, compressors and pumping units. They are built for real heavy duty and rough and tumble service, with the crankcase and cylinder frame cast as a unit and exceptionally well braced for rigidity. The cylinder sleeves are cast of Waukesha molybchrome iron and the crankshaft is of Proferol hard alloy and rides in seven 4-inch main bearings.

An exclusive feature is the non-stick

piston ring standard with all Hesselman engines. It does not give carbon, gum or muck a chance to fill and pack the ring groove. Furthermore, valve grinding is simplified because these are overhead valve engines, so that the heads may be removed and the work done where facilities are most convenient.

The manufacturer stresses the overall economy of the engine, which saves on fuel costs as well as upkeep. These engines operate at the same pressure as an engine designed specifically for use with gas fuel, so that conversion to gas operation is simple.

**A New 4-Tine Grapple**

Each of the four tines of the Owen Type RA grapple, made by the Owen Bucket Co., 6030 Breakwater Ave., Cleveland, Ohio, operates independently of the others. In closing, the tine which encounters the least resistance penetrates into the material and anchors, the other three following in order with a gathering and closing action. Each tine assumes

its proportionate share of the load, thus avoiding excessive stresses on any one.

Two new illustrated bulletins describing the details of construction and giving examples of operation may be secured by those interested direct from the manufacturer.

**Data for Asphalt Users**

Barber Asphalt Corp., Barber, N.J., has issued a new loose-leaf 75-page booklet which contains a wealth of construction data for asphalt users, including tables and specifications, directions for heating and discharging of tank cars, design for agitating equipment in cylindrical tanks and rectangular tanks, capacities of tank distributors, and other data on the application of asphalt in highway work. In addition there are complete specifications for various Trinidad Lake Asphalt products.

Copies of this booklet may be secured free, direct from the Barber Asphalt Corp. by mentioning this item or through this magazine.

**Cletrac Elects H. P. Mee**

H. P. Mee, after two years of retirement from the tractor industry with which he had been associated for twenty years, has been elected Executive Vice-President of The Cleveland Tractor Co., Cleveland, Ohio. Mr. Mee was Vice-President and Treasurer of Caterpillar Tractor Co. from the time of its formation in 1925.

**GRiffin**  
WELLPOINT SYSTEMS  
DRY WET JOBS  
AT A PROFIT!

Write for new catalog,  
"Pointed Wellpoint Facts"

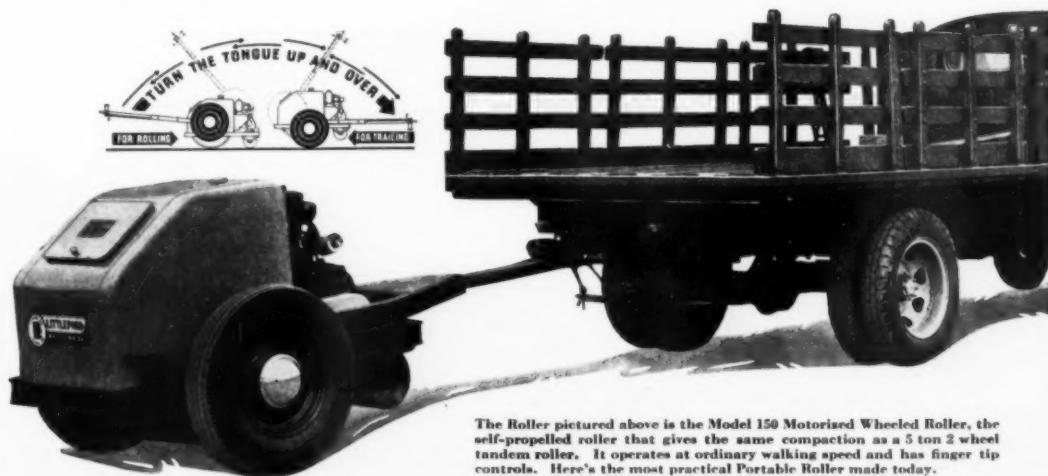
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725 East 140th St., New York, N. Y.  
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**LITTLEFORD**  
*Portable* WHEELED  
ROLLERS

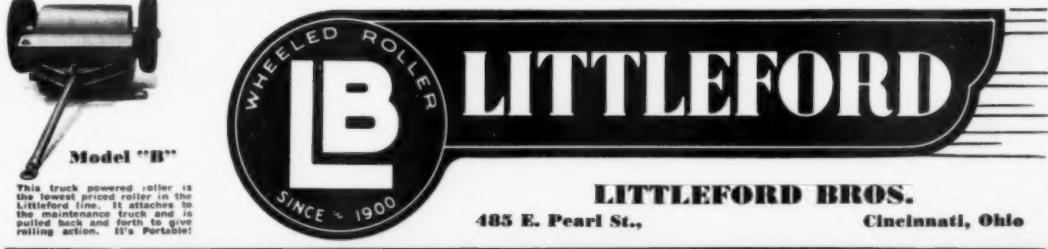
HERE are the Rollers that can be taken to every rolling job, right with the crew. The most startling advancement in modern engineering has been added to these Littleford Wheeled Rollers; that is, Portability. Just attach to any tow hook on any truck and you're ready to go. When on the job, the patented "Tongue Up-and-Over" principle changes it from the trailing position to the rolling position in just 60 seconds.

Just think of it! Priced as low as \$760.00 and yet it saves expensive hauling and there's no time wasted waiting for those big Rollers. Here are the Rollers every Highway Department, Contractor, Airport, Park, Cemetery, Public Utility, and Street Railway Company should have: write for details.

For  
As Low As  
\$760  
F.O.B. C.I.N.O.



The Roller pictured above is the Model 150 Motorized Wheeled Roller, the self-propelled roller that gives the same compaction as a 5 ton 2 wheel tandem roller. It operates at ordinary walking speed and has finger tip controls. Here's the most practical Portable Roller made today.



This truck powered roller is the lowest priced roller in the Littleford line. It attaches to the maintenance truck and is pulled along to give rolling action. It's Portable!

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**Concrete VIBRATORS  
AND GRINDERS**

Write for Circular on types, sizes and prices.

White Mfg. Co.  
ELKHART, INDIANA

## Handling Concrete Work For High-Level Bridge

(Continued from page 1)

loured by the pedestal measuring 26 x 8 feet and 7 feet high with a batter of 1 inch per foot. The pedestal carries two columns 5 feet 4 inches x 7 feet 3 inches and 67 feet high with a batter of  $\frac{1}{4}$  inch per foot on three sides. The cap is 23 feet long, 5 feet wide and 24 inches thick.

### River Bank Piers 1, 2 and 4

Pier 2 at the edge of the river had the footing carried to solid rock, requiring excavation to a depth of 3 feet. There was no pedestal for this pier but the extra size of the footing, which was built up in four steps, took care of the usual functions of a pedestal. The columns for this pier are 56 feet high and the cap measures 23 feet long, 5 feet wide and 24 inches high.

Pier 1 had to be excavated 8 feet deeper than planned to get satisfactory bearing on rock. The footing is 23 x 5 feet and 12 feet high. The pier was built without columns and is 3 feet thick, 21 feet long and 7 feet 3 inches high with a 2-foot cap. The footing for Pier 4 is the same except that it is only 2 feet high and the pier is 6 feet high with a cap 3 feet thick and 2 feet high.

Piers 2 and 3 have two tie beams each of concrete with the upper beam heavier than the lower to care for the extra moment in the structure.

### Concreting the Piers

In order to be able to get his equipment in to the job at the west end the contractor had to grade 2 miles of mountain road upstream to be able to cross the stream where the banks were not too steep nor the stream too wide to bridge easily. Each of the piers was poured in a slightly different manner. Pier 2 footing was poured in one lift with a Ransome 2-bag mixer set on the river bank 40 feet above the top of the footing. Poles cut from the woods nearby were used to frame the runway trestle. All aggregates were weighed in rubber-tired wheelbarrows on one of two Johnson wheelbarrow batchers. Insley rubber-tired concrete buggies were used for wheeling the concrete. Pier 2 was poured in three lifts above the footing.

To pour Pier 3 the concrete mixer

was set up on the east bank just above the water line and a lumber tower built with an elevator for the buggies. The hoist of the P & H crane which was used for the mucking of the footings was used to run the elevator. On Pier 3 a bottom-dump bucket was used with the crane to pour the footing pedestal and the first of the three lifts above the footing.

On all pier concreting the forms were stripped the following day and burlap spread over the top of the lift and a hose run continuously to wet the burlap and the sides of the concrete.

### Concreting the Deck in Winter

The deck was poured during the winter of 1937-38 when the temperature seldom went below 20 degrees F. In order to protect the concrete at all times



Photo by W. E. Bivins  
Pouring Pier 2 of the Bridge Over the Little Tennessee River, with the Mixer on the River Bank at the Same Elevation as the Top of the Pier

against any sudden drop in temperature the contractor used a frame structure 30 x 50 feet over the deck, carried on the cantilever beams that also carried the curb forms. It was skidded along the beams as the pouring progressed

and the concrete cured. The frame consisted of a simple truss of 2 x 4's and was just high enough to admit a man standing. It was completely covered with tarpaulin on the top and sides and

(Continued on following page)

# PRISMO

## SENSATIONAL NIGHT SAFETY MEASURE PERFECTED

### ECONOMICAL • PRACTICAL • SIMPLE

#### MEETING WITH HIGH ACCLAIM BY ALL SAFETY-MINDED MEN

Study the illustration below. The truck was 600 feet from the camera. The picture illustrates the reflection from a PRISMO-treated LIFE-LINE Road Striping; from PRISMO-treated Road Markers and from that new, sensational, easy-to-apply to any surface

#### PRISMO PERMI-BASE

In rolls up to 24" wide (with special, weather-proof, moisture-proof adhesive) so that any one can cut it to any width and apply it to truck bodies, to road-equipment, to obstructions, gates, abutments, posts, etc. Comes in brilliant yellow or glistening white. Millions of PRISMO glass spheres have been partially imbedded in a new material which is flexible and durable.

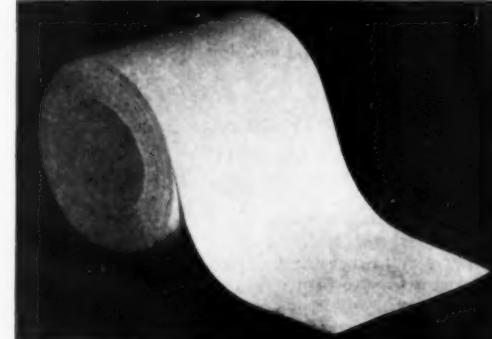
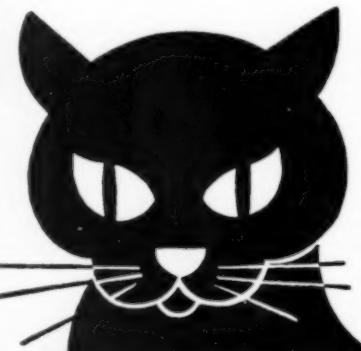
Note that the PRISMO LIFE-LINE Road Striping, laid with an ordinary road stiper, is visible for approximately 800 feet. Note the Road Markers on the shoulders. They are oblong metal PRISMO-treated. Vandal-proof, accepted by many states as an important safety measure.

PRISMO engineers are at your service. Write for the help that is available to you without cost or obligation.

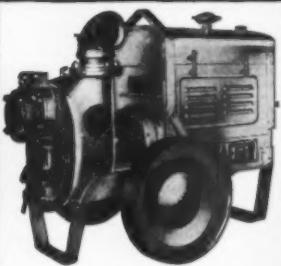
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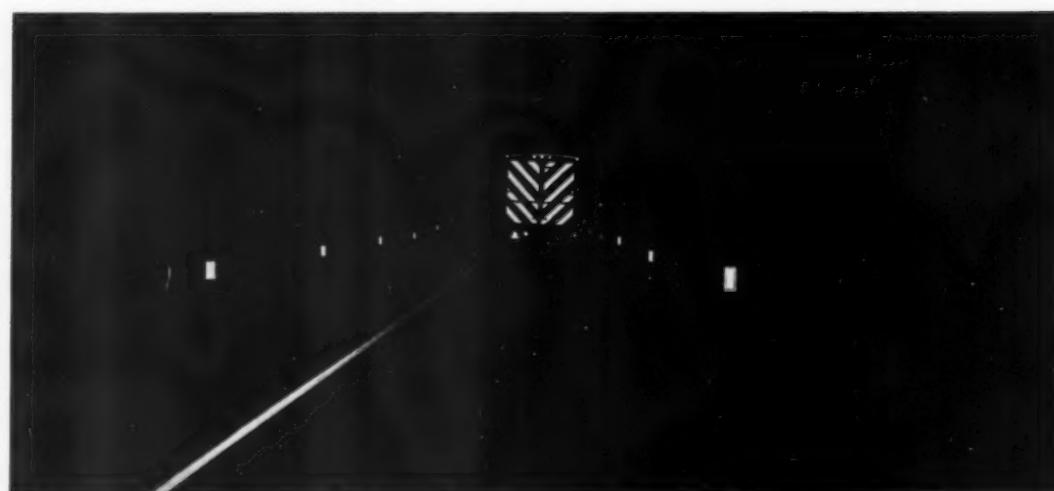
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Samples and informative matter on this important method gladly sent to anyone anywhere. Tell us your problem and our engineers will send data and experiences and methods of application.

#### WRITE TO-DAY



## Form Work Feature Of N. C. Bridge Job

(Continued from preceding page)

sufficient additional tarpaulin was used so that on particularly cold nights curtains could be dropped below the level of the deck and brazier torches set in groups to warm the air beneath the deck forms. Heat for the space under the frame house was furnished by using old oil drums in which scrap wood was burned, with short pipes at the top of the drums to aid the draft. The smoke was retained inside the housing. The house was lighted with ten 200-watt bulbs the current for which was furnished by a Le Roi power plant on a trailer. This plant also furnished power for the vibrators.

While the deck was poured in December and January, the piers were poured ahead of cold weather in the fall of 1937 and the hand rail during the summer of 1938.

For placing the deck forms and also for painting the stringers after the concrete was complete, the contractor used the most simple scaffolding yet seen on a bridge project. A large number of hanging scaffolds were made of 2 x 6-inch planks cut about 2 inches shorter than the distance between the webs of the I-beam stringers so that they could be easily slipped into place. While still on the ground, there were securely nailed to these a pair of 2 x 4 hangers just slightly inside the ends so that they would clear the flanges of the I-beams when the 2 x 6's were in place. Across the bottom, forming the fourth side of the scaffold, was another 2 x 6 which carried the single and double planking for the carpenters and painters. Once two of these were in place the work of setting the deck forms could go ahead easily.

The deck forms were set so that there was a  $\frac{5}{8}$ -inch camber along the inside stringers and 1-inch along the two outside stringers because of the character of the loading with the extra heavy curb section. A 2 x 6 plank was cut to fit freely between the I-beam stringers and was supported by a pair of 2 x 6 posts, one on either I-beam. Nailed to a set of the posts were 2 x 6 wales or longitudinal braces and between these were 2 x 6 struts wedged. The whole frame was wedged up against the upper flange of the I-beams as required to care for the 3-inch shoulder of concrete on either side of the flanges of the I-beams. The camber of the forms was changed at the quarter points of the stringers.

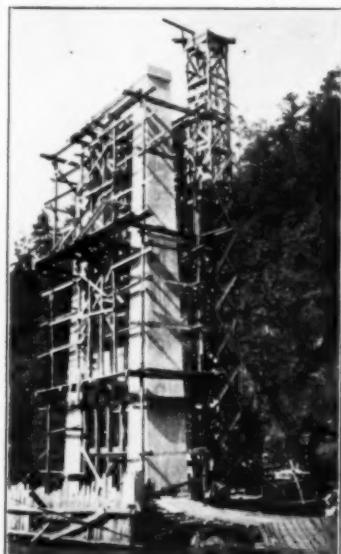
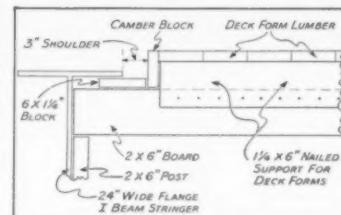


Photo by W. E. Biehs

The Concrete for Pier 3 Was Mixed at the Water's Edge on the East River Bank and Run Up in a Wood Tower for Pouring

The method of setting the forms to care for the shoulder and also the camber was simple and effective. Also it made it possible to use the minimum of expert carpenters and the maximum of "hammer and nail" carpenters. On top of the 2 x 6 which had been cut to fit between the webs of the pair of I-beams a 6 x 1 1/4-inch plank was set, protruding exactly 3 inches from the flange to form the shoulder required. Against this was a 1 1/4-inch board cut exactly to give the proper camber at that point. With these nailed in place the work of the expert carpenter was ended. Then the "hammer and nail" group came along and nailed a 1 1/4 x 6-inch board across the space between the I-beams just high enough to support the form lumber at the same elevation as the board set for the camber. When this was nailed all they had to do was to place the form lumber across the edge of this board. This method also saved the cutting of 2 x 6 lumber for every variation of the camber throughout the work.

With the same scaffolds as used for



Method of Supporting the Deck Forms

setting the deck forms, the carpenters were then able to set the heavy timbers for holding the curb forms. These timbers were 8 x 8's extending 4 feet beyond the outside I-beam and at least in to the flange of the second I-beam. A 3/4-inch bolt with a clamp attached the beam to the flange of the inside I-beam and a pair of the clamps were used on the two sides of the bottom flange of the outer I-beam. At the end of the protruding portion of the beam a block was used to support the curb form. This block also acted as the guide for the

sills of the housing used during the winter for the protection of the deck concrete. A longitudinal 8 x 8 on the block supported the 2 x 6 joists which carried the outside curb forms. Any adjustment was made with wedges.

The actual pouring of the deck was done with the plant set up at the east end of the bridge and the pouring continued through to the west end. The two

(Concluded on page 48)

## WILLIAMS FORM CLAMPS

High Tensile Tie Rods

It costs 8¢ per cu. yd. of concrete for rod replacement in using Williams Clamps on a form design of 800 lbs. pressure per sq. ft.

- Service (24 hr.) phone 3-3823
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# ANOTHER GOOD ROAD

## Made by Good Engineering...Good Products

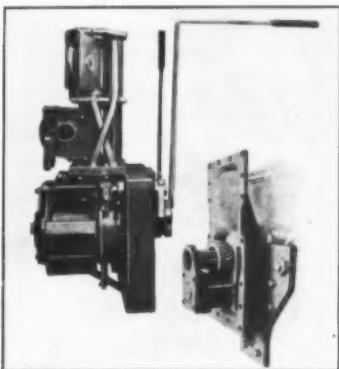


Applying Socony Asphalt Binder, Grand Central Parkway, adjacent to World's Fair, Borough of Queens, New York.

**S**OCONY Asphalt Road Oils • Socony Asphalt Joint Fillers • Socony Waterproofing Asphalt • Socony Cut-Back Surfacing Asphalt • Socony Asphalt Binder A for surface treatment • Socony Refined Asphalt for sheet asphalt paving • Socony Cold Patch Asphalt for all types of patching • Socony Asphalt Binders B & C for penetration work (Asphalt Macadam) • Socony Paving Asphalt 51-60 and 61-70 Penetration for the mixing method (Asphaltic Concrete) • Socony Asphalt Emulsions • Specifications and all other particulars furnished on request.



**SOCONY-VACUUM OIL Co.**  
INCORPORATED  
STANDARD OIL OF NEW YORK DIVISION



The New LeTourneau Power Control Unit

### Power Control Unit With New Features

Features of the new Model T Power Control Unit recently announced by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif., include an interchangeable neck and gear case; interchangeable drums of varying cable lengths; a new brake assembly, with Timken bearings, which it is claimed takes all play and slack out of the brake and gives the operator more accurate control; interchangeable reduction gear sets for the neck, to control line speeds; an improved brake and clutch assembly that automatically eliminates brake drag when the clutch is engaged; controlled lubrication through a new oil ring; herringbone gears at vital points for greater strength and power; and, as optional equipment, Velvetouch brake lining for longer wear and smoother operation. With the interchangeable neck and gear casing, one gear case will now serve any size tractor from D4 to D8, one casing and several necks taking the place of a full set of complete power units.

Three different cable drum lengths, 4, 7½ and 14½ inches, are available. In addition, these new power units have free swinging self-aligning sheaves to give a straight cable pull in any equipment position. The upper sheaves spool the cable evenly on the drum to give support on three sides and prevent distortion by flattening or piling. Machined grooves in the steel sheave wheels give the same three-side cable support and eliminate abrasive wear. The sheave wheels are larger than average and run on heavy-duty roller bearings.

### Stone Working Tools And Scarifier Teeth

Stone and concrete working tools, as well as scarifier teeth, made to meet exacting specifications, of high-grade material, heat-treated and specially finished, are products of the Agerstrand Corp., commercial steel treaters of Muskegon, Mich. This organization has the most up-to-date heat-treating methods aimed to give long life in the various tools produced. Star drills and 4-point hexagon hollow drills, as well as wrecking bars and bush hammers, are among the featured products.

Literature on these products and complete information regarding the production of heat-treated steels to specification may be secured direct from Agerstrand Corp.

### New Catalog on Buckets

All types of Williams buckets, built by the Wellman Engineering Co., 7012 Central Ave., Cleveland, Ohio, from small material rehandling buckets of ½-yard capacity to extra-heavy-duty types are described in detail in a new catalog recently issued by this company. The various types of buckets are well illustrated, and specifications as well as details of construction are given. Copies of this complete catalog may be obtained by interested contractors and engineers from Wellman or this magazine.

### Carbide Lights Used To Speed Airport Job

One of the largest and most modern airports in the country is under construction on Long Island by the City of New York and the WPA. Many thousands of cubic yards of fill have been placed on the site by trucks and man power, working in three shifts of eight hours each for more than a year.

To enable the work to go on during the night, it was necessary to furnish some type of illumination. Although the site of the North Beach Airport is within range of electric power and light lines, during the early part of the work the site was too unstable for the installation of the poles and after the poles were in, there were still many locations on the site requiring some other type of illumination.

To furnish the portable illumination necessary, 200 X-100 V-G lights were purchased from the National Carbide Corp., Lincoln Bldg., New York City. These lights are economical in opera-



A Few of the V-G Lights Used for Night Work at the North Beach Airport on Long Island

tion, simple and easily charged, and readily portable. Having automatic feed, they require no attention when in operation and are guaranteed to give a pure white light from the start of

operation until the last grain of carbide has been consumed. On a job of this sort the lights get very rough handling but, even though they are knocked over, there is no loss of gas.

At the center of the airport site is a shack where all the portable lighting equipment is taken each morning. Here a regular crew inspects and recharges the lights, makes any minor repairs that may be needed, and delivers them where they are to be used that night.

### New York Sales Office

William R. Elden, formerly Chief Engineer and Manager of Engineering Sales, Sauerman Brothers, Inc., Chicago, Ill., has opened an office at 11 West 42nd St., New York City, as a distributor of material-handling and excavating equipment. He will handle the sale of Sauerman products in New York City and vicinity, as well as other lines of equipment for material-handling and for use in the civil engineering construction field.

# Why Not Load the Cheapest Way?

*In loading trucks  
the cheapest way  
is the best way.*

*Let your costs be your guide!*

Barber-Greene Bucket Loaders have been checked against every other method of loading trucks. They have never failed to show substantial savings. They invariably use less power, require less skill. They save truck time, man time, job time. Their versatility makes them useful the year 'round for all types of loading, stripping, light excavating, and unloading cars. They are available with gravity, shaker or high capacity vibrating screens.

The mechanical design and exclusive features of the Barber-Greene place it way ahead in quality, dependability, and ease of operation.

The B-G Patented Automatic Overload Release, which slips when an overload occurs, and automatically resets itself, is one of the many outstanding Barber-Greene features. Others include the Floating Boom, and Tank-Type Chassis.

Phone, write, or wire. There is no obligation.

**BARBER-GREENE COMPANY, AURORA, ILLINOIS**

**BARBER-**



### Water-Weight Roller

A new type of trailer roller for use in patching and similar services is made by the Gledhill Road Machinery Co., Galion, Ohio. Weight is supplied and adjusted by the use of liquid in the tanks; water in summer and waste crank-case oil in winter to prevent freezing. Motive power is supplied by a truck either pulling or pushing the roller.

The roller itself is a cylindrical tank, made of heavy boiler plate with ends of  $\frac{1}{2}$ -inch steel, electrically welded to the rolling surface. A heavy axle passes through the center of the roller and is welded to the end disks, with bearings in the heavy channel frame. Two supplementary tanks mounted on the top of the frame serve the double purpose of added weight and water supply for the perforated pipes which moisten the surface of the roller when needed to prevent sticking to the surface material. Fiber mats are supplied to distribute the water. Scrapers at the front and rear of the roller keep the surface of the



A New Water-Weight Roller

roller clear of sticky materials.

Pneumatic-tired disk wheels are mounted on the frame to carry the entire roller, at full truck speed, between jobs. On the job, the wheels are lifted well above the road surface by means of a toggle mechanism which is easily operated. A sturdy tongue or pole is standard equipment, with steerable tongue optional.

Literature describing this roller may be secured by state and county highway engineers and contractors direct from the manufacturer by mentioning this item, or from this magazine.

### Cement Association Wins National Award

The American Trade Association Executives Award for 1939 has been awarded to the Portland Cement Association, Chicago, Ill., for the development of soil-cement roads. This award is made each year to the trade association which has rendered outstanding service to its industry, to industry in general, and to the public, in the opinion of The American Trade Association Executives. The medallion representing this honor was presented to William M. Kinney, Vice-President and General Manager of the Portland Cement Association, by Edward J. Noble, Executive Assistant to Harry L. Hopkins, Secretary of Commerce.



One of the Dredge Barge Pontoons in the Shop During Welding

### Dredge Barge Pontoons Shipped on Flat Cars

A launching by rail was the novelty accorded twin steel dredge barge pontoons by the American Hoist & Derrick Co., St. Paul, Minn. At the tail end of a late spring blizzard, two sturdy steel pontoons were shipped from St. Paul, Minn., to Haythorne, Nebr., on two flat cars for the construction of a double pontoon dredge barge for the Minneapolis Dredging Co.

The pontoons are of all welded steel construction, 4 feet deep, 12 feet wide and 60 feet long. Each barge has three water-tight compartments and is strongly braced inside with channels lengthwise and crosswise. Each pontoon is decked over with welded steel plates, with a hatch opening into each compartment. At Haythorne the two pontoons are being bolted side by side and the dredge equipment, including American hoists, winches, A-frame, etc., is being installed.

For shipment the two pontoons were up-ended on their sides and fastened to the cars deck to deck. Swivelling bolsters at each end of the pontoons insured easy riding on curves. The barges were designed and built by the American Hoist & Derrick Co., which started two more as soon as these pontoons were pulled out of the shop.

### New OK Hoists for Low-Mounted Bodies

The Anthony Co., Streator, Ill., has announced the addition of three new hydraulic hoist models to its line of OK low-loading-height hydraulic hoists. One of the new OK hoist models features extra low mounting, the other, high tipping angle and the third extra low mounting with high tipping angle. Both high tippers have a dumping angle of 70 and 82 degrees. Four to 6-inch lower mounting has been accomplished by telescoping the body frame for easier loading. It also greatly lowers the center of gravity and permits more than a 50 per cent increase in strength of the structural members without increasing weight, according to the manufacturer.

The double-arm cam lift design of the hoists is used only where it is needed, the first 25 degrees, for power. In the last 25 degrees of dumping angle, the direct-lift principle is used for speed.

Literature describing and illustrating Anthony hydraulic hoists and dump bodies for any truck chassis of any capacity may be secured by those interested direct from the manufacturer by mentioning this magazine.

### Elevating Grader Booklet

The features of Adams elevating graders are outlined in detail in a new catalog recently issued by J. D. Adams Co., Indianapolis, Ind. Mechanical and operating features are described and illustrated, complete grader and engine specifications are given and there are many interesting photographs showing applications of these units on a variety of jobs throughout the country. A copy of this booklet, Form 396, may be secured by those interested direct from the manufacturer by mentioning this item.

### B-G MIXERS



THE Barber-Greene Bituminous Mixer operates continuously. Continuous operation permits a relatively small machine for its high hourly capacity. It is usable either in a central or travel plant set-up, is highly portable, and is equally superior in stabilized or bituminous work.

### B-G FINISHERS



BARBER-GREENE users are the most enthusiastic boosters for the Barber-Greene Tamping-Leveling Finisher. The Engineers approve and praise the level mat compacted to stay level by the B-G Tamper. The Contractors not only have the satisfaction of laying the finest road, but enjoy the substantial cost savings effected by doing the job once—right with the minimum of labor. Write for the B-G Finisher Booklet.

Q1

### B-G DITCHERS



BARBER-GREENE Ditchers are made in four different models: The Standard machine for general ditching up to 8' 3" deep and 24" wide, The Pipe-Line Special for fast cross country work, The Utility Special with the Off-Set Boom for working in close quarters, and The Service Special for easy trailer hauling, and small service jobs.

### B-G CONVEYORS



BELT Conveyors are recognized as the cheapest means of transporting materials over short distances. In addition to this important feature, Barber-Greene Belt Conveyors have many other advantages. Their Standardized Sectional Construction gives easier, faster erection, more flexibility, prompt shipment from stock, and high resale value. Barber-Greene Belt Conveyors are built for contracting.

Q2

**BARBER-GREENE COMPANY, AURORA, ILLINOIS**

**B-GREENE**



## Job Clinic Provides 24-Hour First Aid

(Continued from page 2)

a hearing and sight test, examinations for hernia and for old deformities and scars. If any of the men are away from work for ten days or more, they must undergo a complete re-examination before they can go on shift.

Employees are treated for all major and minor injuries in accordance with the regulations of laws governing workman's compensation. This Clinic is the first line of defense, in preventing lost time, as wounds are treated before they can become infected or before infection can attack the tissues. The Clinic is only one part of the larger safety program of this contractor, which includes giving all laborers safety shoes with steel toe caps at cost and providing them with hard hats. Attention throughout the work is given to protruding nails, which has greatly reduced the number of puncture wounds. The engineering and administrative staff, as well as the workmen, have formed the habit of going to the Clinic immediately with even the slightest scratch. Prompt treatment of minor wounds at the outset prevents the injury from becoming a "case," thereby reducing in large measure the "Lost Time" account.

One interesting story of a workman's faith in the Clinic is of particular interest. He fractured the bone in his little finger, was examined at the Clinic, and immediately sent to the head offices of the doctors for an X-ray examination. The pictures showed that the finger needed the treatment of a specialist so an appointment was made. The workman was then given a letter and told to deliver it with the negatives to the specialist. A short time afterward he appeared at the Clinic and asked the nurse on duty to mail the pictures to the specialist for he hadn't time to lose as his shift was about ready to go on duty. "What did it matter, since the finger was well-bandaged?"

### Personnel

The Clinic and Medical Department for Spencer, White & Prentis are in charge of Dr. Alexander Wolff, with Dr. J. J. Schriver assisted by Dr. M. J. Hurley in direct charge of air examination and air illness. The Clinic is open twenty-four hours a day, with Dorothy Valentine, a registered nurse and graduate of Newark, New Jersey, City Hospital, on duty from 8 a.m. to 4:30 p.m. Dr. M. A. Raif and W. E. Jones, R.N. are on duty on the second and third shifts respectively.

The senior associated physicians of this Clinic have been engaged in the staffing of clinics for construction projects in the New York Metropolitan area for more than twelve years and have been responsible for the clinics on such large projects as the Empire State Building, the Lincoln Tunnel and practically all of the downtown subaqueous tunnels.

### Minnesota Restricts Loads to Save Roads

Unusual spring break-up conditions in Minnesota forced the State Highway Department to put the unprecedented number of 4,594 miles of state trunk highways under load restrictions this spring to protect millions of dollars worth of road surfaces from costly damage or destruction by heavy traffic. The mileage restricted is more than 43 per cent greater than the mileage posted during the spring restriction period last year, Highway Commissioner M. J. Hoffman announced.

The major factors contributing to the

cause of the unusual number of frost boils and heaves this season are: high moisture content in the ground last autumn; the mild weather prevailing during the early winter months, allowing capillary water to work up near the road surfaces wherever they are underlain by dense soils; severe cold during February, repeatedly freezing down into the capillary water deposits, the expansion of which created frost heaves; and the sudden and abnormally high temperature in late March which caused rapid thawing beneath highway surfaces and released an unusual amount of water which, unable to escape downward, was forced up through the surfaces.

This unusual condition will necessitate considerable surface patching and repairing, especially on the bituminous roads, and may require additional filling of cracks and joints in concrete pavements, especially where the bases are not stable. The various restrictions on the highways reduced to a minimum the damage to surfaces and grades and thereby, even at the cost of some im-

mediate inconvenience, protected the public's large investment in trunk highways.

Of the restrictions, 3,032.6 miles were limited to 4 tons, 987.4 miles to 5 tons, and the remaining 574 miles were posted for limitations varying from 6 to 10 tons. Last year only 2,600 miles of restrictions were necessary while in 1936, 4,553 miles of trunk highways were restricted.

### Hercules Powder Co. Moves New York Office

The New York City office of Hercules Powder Co. of Wilmington, Delaware, has been moved to 500 Fifth Avenue. W. M. Annette is in charge, with Rex St. Clair as Manager of Explosives Sales and G. C. O'Brien continuing as Manager of Naval Stores Sales and Supervisor of general office activities.

**BROWNING**  
has had no peer for 40 years

RAIL CRANES  
SHOVELS  
DRAGLINES  
ZEE ROTATORS
AT YOUR SERVICE  
FOR THESE PRODUCTS

**THE BROWNING CRANE & SHOVEL CO.**  
Established 1899  
Main Office and Factory 18228 Waterloo Rd., Cleveland, Ohio  
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CRAWLER, TRUCK AND WAGON DRAGLINES SHOVELS CRANES - HOES

**BROWNING PRODUCTS**

DIESEL GASOLINE STEAM ELECTRIC

PACIFIC GAS & ELECTRIC CO. STANISLAUS TUNNEL... SHASTA DAM DIVERSION TUNNEL... GRAND COULEE PENSTOCK TUNNELS... ROZA TUNNEL RUBY DAM DIVERSION TUNNEL... LOCH RAVEN-MONTEBELLO AQUEDUCT

And

**The Largest Tunnel Job of All for Gardner-Denver  
Automatic Feed Drifting Drills**

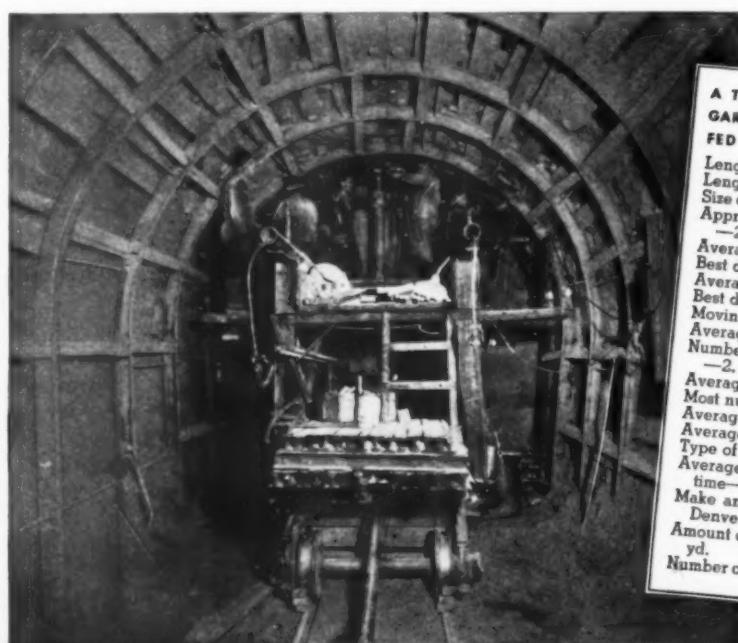


## DELAWARE AQUEDUCT NEW YORK CITY WATER SUPPLY TUNNELS

Since their introduction Gardner-Denver Automatic Feed Drifting Drills have been or are being used on *every important tunnel job in the country!* The reason for such overwhelming preference is simple—Gardner-Denver AF-89 (3½") and AF-99 (4") Automatic Feed Drifters advance

the work faster—at lower cost—under all drilling conditions. The performance of Gardner-Denver Automatic Feed Drifters speaks for itself—and is a matter of record. Let us give you full operating data that show you what these better drills can do on YOUR tunnel jobs! Gardner-Denver Co., Quincy, Ill.

Gardner-Denver AF-89  
Drifters on Roza Tunnel Job



A TYPICAL RECORD—PERFORMANCE OF GARDNER-DENVER AF-99 AUTOMATICALLY FED DRIFTERS ON RUBY TUNNEL JOB  
Length of tunnel—982'.  
Length of connecting raise 90'.  
Size of bore—horseshoe 27' high, 34' wide.  
Approximate average cubic yards per foot  
—27.  
Average daily advance—12'.  
Best day advance—15'.  
Average drilling time—14 hours.  
Best drilling time—8 hours.  
Moving Jumbo, loading holes—4 hours.  
Average mucking time—6 hours.  
Number of drills on Jumbo—9. In reserve  
—2.  
Average number of holes drilled—139.  
Most number of holes drilled—151.  
Average depth of holes—13'.  
Average depth of cut holes—15'.  
Type of rock drilled—hard granite.  
Average number of drills operating at one time—7.  
Make and model of drills used—Gardner-Denver Model AF-99.  
Amount of powder used—4.07 lbs. per cu. yd.  
Number of exploders used—48 per cu. yd.

**GARDNER-DENVER** 

### Return Idler for Use On Conveyor Belts

The Robins Conveying Belt Co., 15 Park Row, New York City, has recently developed the Rubberdisc return idler for use on any conveyor belt which handles abrasive, corrosive, damp, or somewhat sticky material. It is constructed of a steel tube shaft on which are mounted a series of rubber discs, spaced about 6 inches apart except at the ends where the last two are about 3

inches apart. New Departure ball bearings, requiring no greasing or oiling and completely sealed against grit or moisture, are mounted within the steel tube. The resilient and flexible rubber discs and the open construction with the belt supported at only a few points make this a self-cleaning idler, eliminating the possibility of conveyed material building up. Because of non-slippage and because there is much less wear in a rubber-to-rubber contact than in rubber-to-metal, abrasion of both the belt

and the idler is greatly reduced, according to the manufacturer.

Complete information on this Rubberdisc return idler may be obtained by those interested direct from the manufacturer, or from CONTRACTORS AND ENGINEERS MONTHLY.

### Complete Wrench Sets

The Blackhawk Mfg. Co., Dept. J1849, Milwaukee, Wis., has recently issued a new catalog on its Nugget series of

wrenches. These wrenches are made of Hexite steel for greater strength, are equipped with a thumb release Lock-On feature that prevents sockets and attachments from slipping off, and are fully interchangeable as one series of handles is used with all sockets,  $\frac{1}{16}$ -inch to  $1\frac{1}{4}$ -inch, covering the full spread of  $\frac{3}{8}$ -inch and  $\frac{1}{2}$ -inch requirements. These new wrenches have a  $7/16$ -inch square drive, making possible the elimination of the two old series now generally used in all mechanical work.

# SAVES PROFIT-KILLING SHOVEL MOVES

MOUNTAIN ROADS MAKE SHOVEL MOVE TOO EXPENSIVE  
FOR 3500 YARD JOB . . . WM TRACTOR AND HOUGH  
LOADER SAVE CONTRACTOR'S PROFIT . . . ALSO ELIMINATE  
TRUCKS IN PIT BY DOING BOTH DIGGING AND HAULING

Contractor Silabaugh needed 3500 yards of gravel from a nearby pit for concrete footings on bridge structures near Lowman, Idaho. Moving a shovel in over mountain roads for this small quantity would kill his profit. He saved the day . . . and the profit . . . with a WM tractor and Hough Loader. This outfit loaded directly onto the grizzly of the crusher, thus did away with truck hauling in the pit. Though runs of 250 feet were frequently necessary, 250 yards of gravel were handled each shift.

Like Silabaugh, you can profit by using the WM tractor and Hough Loader . . . easily dig and load 30 to 40 yards of clay, dirt, sand or gravel hourly . . . move the rig from job to job on its own transport wheels. Ask your Allis-Chalmers dealer to show you . . . on your own job . . . what this fast-moving outfit can do.

**ALLIS-CHALMERS POWER**  
TRACTOR DIVISION - MILWAUKEE, U.S.A.



WM tractor and Hough Loader dig a big load out of the far end of the pit (below) carry it 250 feet and dump directly into the grizzly (above) of the crusher.



# Road Material Mixed in Pits

**C. G. Fuller, Contractor, Widens 22-Foot Base for 14.5 Miles on U. S. 17 Cut-Off in South Carolina**

IN the late fall of 1937, C. G. Fuller of Barnwell, S. C., completed 14.5 miles of 22-foot sand-asphalt road-mix base 5 inches thick and sealed with 50 pounds per square yard of mixed-in-place treatment on U. S. 17 west of Johns Island and continuing through Rantowles, S. C., a major north and south coastal highway used increasingly by tourists. This improvement, a major cut-off, increased traffic to a far greater extent than was anticipated by the State Highway Department and since the permissible width of trucks, busses and trailers has been increased, made it practically mandatory that this high-speed section should be widened immediately to 24 feet.

The contractor was given an extension of his contract for the widening. The earlier work had been mixed with a Jaeger mix-in-place machine, but this could not be repeated with the material spread and compacted in place and with heavy traffic using the highway. This led to a novel method of preparing the road-mix material for the widening strip in pits. Two separate pits, about 5 miles apart and about 500 feet long and 100 feet wide, were used where the sand was suitable for mixing. The material was thrown up into a windrow with a blade grader and then mixed with a Barber-Greene road mixer at the rate of about 2,500 cubic yards per day. It was not necessary to strip these pits as they were fields which had been cultivated the previous year and were free of sod and roots. The asphalt was applied at the pugmill within the machine at a rate so as to give 3.5 gallons of RC-2A asphalt per square yard of 5-inch material compacted. The windrows of mixed material behind the Barber-Greene machine were spread out for curing by an Allis-Chalmers hydraulic-control grader with a 14-foot blade pulled by an RD7 tractor. The material was spread to a maximum thickness of 18 inches in the pit and 50 feet wide for storage prior to being removed for spreading on the road.

In preparing the material in the pit the contractor worked two shifts of 10 hours each and the Barber-Greene mixer was equipped with lights fore and aft for which the current was furnished by a Johnson Iron Horse lighting unit. The machine carried two 400-gallon asphalt tanks and these were reloaded from an 800-gallon feeder tank by using the loading pump on the front of the Barber-Greene machine.

#### Spreading the Widening Strip

Before the pit-mixed material was placed, the contractor cut out 1½ feet from the edge of the old pavement. This trenching was done by hand in order to secure a vertical slide so no material would be lost and to prevent the narrow strip from shoving out of place. The 3-foot strip was filled with 5 inches of compacted pit-mixed material.

A novel method of placing the material in this trench was used. A hopper was placed over the end of a Barber-Greene belt conveyor loader which was hauled down the road. The truck hauling the pit-mixed material dumped into this hopper and the belt carried the material to the side of the road, spilling it in the trench where it was bladed and then compacted with a pneumatic-tired truck and a pneumatic-tired roller. The widening operation was carried on on both sides, so that the trench width was

variable. The mixed mat or seal will be placed later by the State maintenance crew in this district or when the entire road is re-treated.

#### Personnel

This extension of Federal-Aid Project 338A and B, Parts 1 and 2, was completed by C. G. Fuller, contractor of Barnwell, S. C., with Howell C. Jones as Superintendent. D. M. Crockett was Resident Engineer for the South Carolina State Highway Department on this project until promoted to be Assistant District Engineer at Orangeburg, S. C.

#### Hand and Power Winches

Ramsey all-steel power winches, with electric, gasoline or air motors, for loads up to 2 tons, and Ramsey three-speed hand winches in a 3-ton, 5-ton standard and 5-ton heavy-duty model, are described and illustrated in a folder on Ramsey equipment issued by the Ramsey Machinery Corp., 1626 N. W. Thurman St., Portland, Ore.



**BAKER**  
Bulldozers  
and  
Gradebuilders  
have every feature  
for most efficient  
operation



For tearing through on tough jobs or just plain bulldozing, Baker Bulldozers and Gradebuilders can be depended on to pull you through at a lower operating cost. Write for latest bulletins.

**THE BAKER MFG. CO.**  
585 Stanford Ave. Springfield, Illinois

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Hydraulic Scrapers with flat digging angle. 3 yd., 5 yd. (2 wheel), 8 yd. and 10 yd. (4 wheel). Ask for details on these outstanding new scrapers.



## Watch those sheave grooves FOR SIZE

REGARDLESS of its quality and construction no wire rope can give you maximum, economical service if sheave grooves have worn so deep and narrow on previous ropes as to act like a vise on new full-sized lines. Or, if sheave grooves have worn so wide as to no longer support the rope—causing flattening and excessive wear.

The diameter of sheaves must be large enough at all times for the rope construction and size. And they must be properly maintained. Worn grooves may be rough, and will tear the rope. Grooves built up by welding must be machined, or their rough surface will shorten rope life. Above all, sheaves and grooved drums should be checked before each new rope is in-

stalled; if the proper size sheave gage will not bottom or if the next largest size will bottom, they should be regrooved or replaced. Consistently observing these simple precautions will pay big returns in greatly improved rope life and increased safety.

This advertisement is published in the interest of all wire-rope users—to help them get safer and more economical service from their wire rope. Bethlehem will be glad to have a wire-rope engineer study your applications and give you personal advice on wire-rope problems. There is no obligation for this service—call the nearest Bethlehem district office, or write to Bethlehem Steel Company at Bethlehem, Pa.

**BETHLEHEM STEEL COMPANY**





The New Littleford Traf-O-Line Marker

### New Self-Propelled Traffic Line Marker

A new traffic-line marker which is hand-controlled and guided but self-propelled has been announced by Littleford Bros., 485 East Pearl St., Cincinnati, Ohio. It is designed to paint stripes, single or double, with any kind of paint or lacquer as well as cut-back asphalt in widths from 2 to 8 inches at an all-day rate of 2 miles per hour.

A  $\frac{5}{8}$ -hp Johnson engine, running all day on about 12 cents worth of gasoline, powers the machine, including self-propulsion as well as driving the paint pump. The guide runners or sleds oscillate, making it possible for one of them to hit a high spot and the other to keep in touch with the road surface on a lower level, thus assuring a smooth mark even on rough pavements. The rear wheel is a caster that can be locked in place when doing straighthaw line marking. When unlocked, plain and fancy marking, arrows, curves, figure eights, or any other desired stripes can be handled.

The paint can holds 7 gallons, making it possible for the operator to add a full 5-gallon can of paint to the marker while he still has a gallon or so in the machine. The bottom is concave so that all the paint flows down into the sump, making the outfit easy to clean. Paint is constantly circulated by the pump, which delivers approximately three times as much paint as can be applied through the nozzle. Surplus paint is bypassed back into the tank. This means the lines are always free and when the discharge valve is shut off all the material by-passes back into the tank, which is important in handling any materials which have a tendency to settle when not kept in agitation.

### Corrugated Iron Pipe For Drainage Service

A new well-indexed 70-page illustrated book on the application of corrugated pipe to drainage service has recently been issued by Gohi Culvert Manufacturers, Inc., Newport, Ky. Taking the discussion of rust-resisting pipe from the discovery of Gohi pure iron-copper alloy up to date, the booklet enumerates the advantages of this type of pipe for highway drainage, to reduce embankment erosion, for bridge replacement, for railway and airport drainage.

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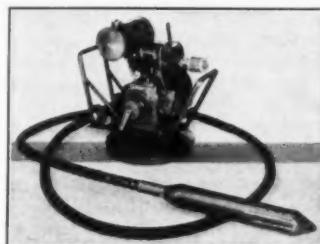
its use in parks and on subdivisions, and for checking soil erosion. Various forms of Gohi corrugated pipe are illustrated and its use for sewers and perforated pipe for special drainage problems are discussed in detail.

The book also contains valuable design data and tables which will be helpful to any engineers. These include discharge tables, capacities of ditches and the velocities at which various types of sediment are transported, as well as many standard engineering tables.

Copies of this book may be secured direct from Gohi Culvert Manufacturers, Inc., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

### New Vibrator Model

An addition to its line of concrete vibrators was recently announced by the White Mfg. Co., Elkhart, Ind. This new Model M-12 concrete vibrator is equipped with Wisconsin 3-hp gasoline engine with outside magneto, impulse



A New White Vibrator

coupling and Twin Disc clutch mounted on a free swiveling base. The engine, operating at 2,600 rpm, turns the flexible drive shaft through a 2 to 1 speed increase V-belt drive with ball-bearing countershaft. This feature permits running the engine at normal speed while at the same time giving the desired increased speed for the vibrator.

The vibrator itself consists of an off-center rotor mounted on double ball bearings, encased in an abrasion-resist-

ing steel tube with welded manganese ribs. The flexible drive consists of an internal piano-wire welded core encased in a molded rubber tube with internal spiral steel bearings. This rubber housing is furnished either with or without an external steel spiral armor.

A feature of White vibrators is the full interchangeability of the 7 or 12-foot long driving sections, and the detachability and interchangeability of the vibrator heads in several sizes. For use in narrow forms, a vibrator  $1\frac{1}{8}$  inches in diameter  $\times$  17 inches long is used, while for ordinary mass vibration either a  $2\frac{3}{8}$  x 21-inch or a 3 x 21-inch vibrator is available. A  $3\frac{1}{2}$ -inch vibrator may be used for heavy jobs and is usually attached to a 4-hp engine. The same types and sizes of vibrators and drives are also furnished with electric-motor power units.

Want any information on equipment? Write the Editor.

## INTERNATIONAL HARVESTER

sells MORE HEAVY-DUTY TRUCKS (2-ton and up)  
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**I**N ever-increasing numbers, truck users are investing in the truck that bears the Triple-Diamond mark. They are *cashing in* on the *high-quality standard* maintained for International Trucks during thirty-two years of truck manufacture . . . a quality standard of which every man in the Harvester organization is proud.

Another practical reason for the great demand for International Trucks is the fact that they are backed by the *most complete Company-owned truck service organization*. Whatever your own hauling need, the International dealer or branch near you has the truck for it. Sizes range from  $\frac{1}{2}$ -ton light-delivery trucks to big 6-wheelers.

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180 North Michigan Avenue

Chicago, Illinois



# INTERNATIONAL TRUCKS

### New Mixer, Truck-Mixer And Paver Catalogs

Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis., has recently issued five new catalogs of particular interest to contractors and to highway officials. Bulletin 341 on the Rex 27-E Pavemaster has many illustrations and illuminating details on the Rex batch cycle timed by the Rex mechanical man. Bulletin 342 describes the Rex 3½-S half-bag filter. Bulletin 343 covers 5-S and 7-S mixers, and Bulletin 344 the larger 10-S and 14-S side and end-dump mixers in trailer and four-wheel mountings.

Catalog 340 contains the most complete description yet offered of the Rex Moto-Mixers and Moto-Agitators with a long list of jobs where this equipment has been used and a roll call of Moto-Mixer fleets. The balance of this 40-page catalog is devoted to detailed illustrations and discussions of the fine points of the features on the various sizes of Rex Moto-Mixers and Moto-Agitators.

Copies of any or all of these catalogs may be secured by writing to Chain Belt or this magazine and identifying the catalogs desired by number.

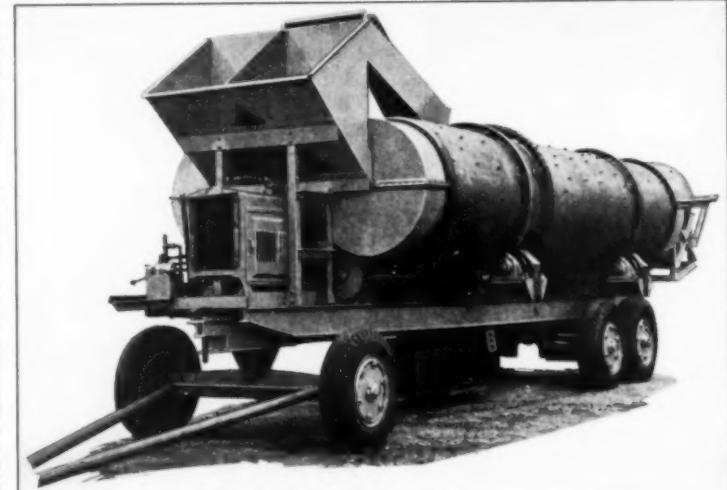
### New Portable Dryer For Road Aggregate

The Barber-Greene traveling dryer, recently announced by the Barber-Greene Co., Aurora, Ill., was designed to provide portability, flexibility and ease of set-up in a dryer for use on bituminous road construction requiring dry aggregate for the mix. The B-G dual-drum travel dryer consists of three units: a B-G Special 82-A bucket loader which picks up the aggregate from the windrow; the dual-drum dryer which receives the material from the loader, dries it and discharges it back on the road in a windrow; and the portable boiler which is towed behind the dryer and has special cantilever axles in order to straddle the windrow. The dryer unit is equipped with a power-operated hydraulic hoist with finger-tip controls which enable the drums to be held at the correct operating angle whether traveling up hill or down. There is also a road heater underneath the dryer to dry the subgrade before the windrow is re-deposited upon it.

The framework of the dryer is of heavy welded steel, with heavy chilled

cast iron trunnions and rolled steel drum tires. Special Carbonite metal is used for the trunnion bearings. All running gear and trunnions are well guarded and a safety ratchet on the tilting drums locks the drums in position in addition to the hydraulic hoist itself. Grease pipe extensions make possible the lubrication of all bearings from the outside of the machine without stopping operation. In the combustion chamber a combustion cone serves to mix the correct amount of air with the flame and directs the flame uniformly for the full length of the chamber. The burners utilize steam under pressure to atomize the oil. Instead of the conventional type of flights, the B-G dryer has a series of short flights, staggered in such a manner that there is always an even veil of material in suspension over the drum's cross section, in order to place the maximum amount of stone in direct contact with the heat.

Further details on this B-G traveling dryer, which the manufacturer claims will handle from 50 to 100 tons an hour,



The Barber-Greene Portable Dryer Unit in Transport Position

are contained in Bulletin 833, copies of which may be secured direct from the Barber-Greene Co. or from CONTRACTORS AND ENGINEERS MONTHLY.



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BETTER BUILT BASKET BUCKETS

- 1. You use a larger bucket due to the features eliminating weight where not needed.
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All water is eliminated which gives a dry fill. All suction in bucket eliminated, giving a 100% load.

Write for full profit story of our patented shell and Basket Buckets.

**YAUN DRAGLINE BUCKETS & MANUFACTURING PLANT**  
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• You'll never "throw" these crawlers with sharp turns, because there's no tendency to force rollers off the shaft. Side pressures are taken between crawler frames and shoes, so the ground takes the skid—not the crawler track. P&H crawlers work on the roller chain principle with double sprocket drive. There's no slapping or jerky action to cause damage in travel. By putting an end to common crawler troubles, these new P&H machines have solved a major item of lost time and expense.



Write for literature on the size and type that interest you. Harnischfeger Corporation, 4419 West National Avenue, Milwaukee, Wisconsin.



# To Modernize Road Heavy Grading Job

**Wisconsin Route 42 Along Lake Michigan Improved By Kramp Const. Co. With Scrapers and Graders**

(Photo on page 52)

THE late autumn of 1938 saw the completion of a 230,000-yard grading job in heavy red gravelly clay by Kramp Construction Co. of Milwaukee, Wis., in Manitowoc County, Wisconsin. The contract was awarded by the State Highway Commission on the low bid of \$79,191.94 and work was started May 26, 1938. The rough dirt work was completed October 8, and the final dressing on December 2, except for seeding which was done early this spring.

State Highway 42, together with U. S. 141, follows the shore of Lake Michigan north from Milwaukee for about 35 miles, at which point Route 42 continues straight north to cut back to the Lake at Manitowoc, while 141 follows the lake shore through the city of Sheboygan. U. S. 141 between Sheboygan and Manitowoc is an old road tending to be rough and not very straight. The work described below is one of several construction projects aimed to convert State Trunk 42 in this section into a modern highway. The new alignment is straight with a wide right-of-way and when paved will carry a large part of the traffic now taken care of by U. S. 141.

## Method

The cuts and fills were about equally divided on this 6.245-mile grading and drainage project. The largest cut was 18 feet deep, 1,700 feet long and required the removal of about 33,000 cubic yards. The largest fill was 17 feet high and 1,700 feet long, requiring 25,000 yards of material. The other cuts and fills ran from 10 to 12 feet.

About 100,000 yards of the total was handled with a 1½-yard Koehring shovel loading to four Dumptors. The remaining 180,000 yards was handled with tractors and scrapers. The average haul for the Dumptors was 1,000 to 1,500 feet, while the average scraper haul was 450 to 500 feet. The heavy red gravelly clay with not much stone, except in the heavier cuts, made ideal scraper dirt.

For scraper equipment Kramp used an Allis-Chalmers Model L pulling a 12-yard Gar Wood scraper, two A-C Model L's with 7-yard Continental scrapers, a Caterpillar D8 with a 12-yard LeTourneau Carryall and a Caterpillar Sixty with an 8-yard Carryall. For moving fill for small depressions and for work around the shovel, an A-C Model K tractor with a Drott bulldozer was employed, and the finished grade was made with an Allis-Chalmers Model 112 leaning frame blade grader pulled by one of the Model L tractors.

## Quantities and Unit Prices

The principal items in the estimate were as follows:

Unclassified excavation.....	241,222 cu. yd.
Borrow.....	35,523 cu. yd.
Marsh excavation.....	6,269 cu. yd.
Finishing roadway.....	344.5 stations
Reinforced concrete pipe, 24-inch.....	1,536 feet
Reinforced concrete pipe, 30-inch.....	428 feet
Reinforced concrete pipe, 36-inch.....	96 feet
Reinforced concrete pipe, 42-inch.....	204 feet
Corrugated galvanized sheet metal pipe, 18-inch.....	1,938 feet
Corrugated galvanized sheet metal pipe, 30-inch.....	150 feet
Guard fence.....	6,060 feet
Seeding.....	323,700 sq. yd.

The following are the principal unit prices on this contract:

Clearing.....	\$40.00 per acre
Clearing trees.....	.17 per in. diam.
Grubbing.....	70.00 per acre
Grubbing trees.....	.23 per in. diam.

Marsh excavation.....	.15 per cu. yd.
Unclassified excavation.....	.17 per cu. yd.
Borrow.....	.15 per cu. yd.
Sand gravel fill.....	.70 per cu. yd.
Finishing roadway.....	12.40 per station
Concrete surface drain.....	16.00 per cu. yd.
Old road obliterated.....	5.60 per station
Mortar rubble masonry.....	6.00 per cu. yd.
Reinforced concrete culvert pipe, 24-inch.....	3.37 per foot
Reinforced concrete culvert pipe, 30-inch.....	4.66 per foot
Reinforced concrete culvert pipe, 36-inch.....	5.96 per foot
Reinforced concrete culvert pipe, 42-inch.....	7.53 per foot
Reinforced concrete culvert pipe, 48-inch.....	9.68 per foot
Riprap.....	2.00 per cu. yd.
Grouted rubble pavement.....	1.25 per sq. yd.
Cable guard fence.....	.78 per foot
Cable guard fence anchorages.....	10.65 each
Marker posts.....	.50 each
Seeding.....	.006 per sq. yd.

## Labor Rates and Hours

The minimum wages for labor on this contract in the three classifications of skilled, intermediate and unskilled labor, were as follows:

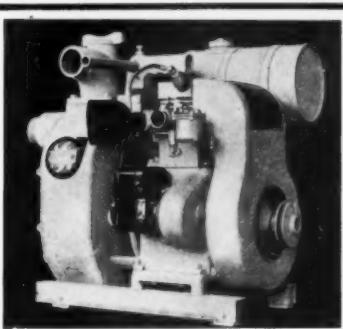
Skilled labor.....	\$85 to \$150 per hour
Intermediate grade labor.....	.60 to 1.35 per hour
Unskilled labor.....	.60 to 1.00 per hour

The contract limits for labor were a 40-hour week for both labor and equipment and the contract time for the job

was 215 calendar days. The job was completed under almost ideal conditions and only ten days were lost on account of rain.

## Personnel

This job, Contract No. 3, State Project No. 3780 (North Section on State Trunk Highway No. 42) was under the jurisdiction of the Green Bay District Office, D. F. Culbertson, Division Engineer, and Webb Chapman, Resident Engineer. H. V. Ballantyne was Superintendent for the Kramp Construction Co.



## 2" Light-Weight

### High-capacity, Self-priming Pump

Total weight 97 pounds, including 2-hp. air-cooled engine. Guaranteed self-priming up to 25'. Total head 50'. 8,000 g.p.h.

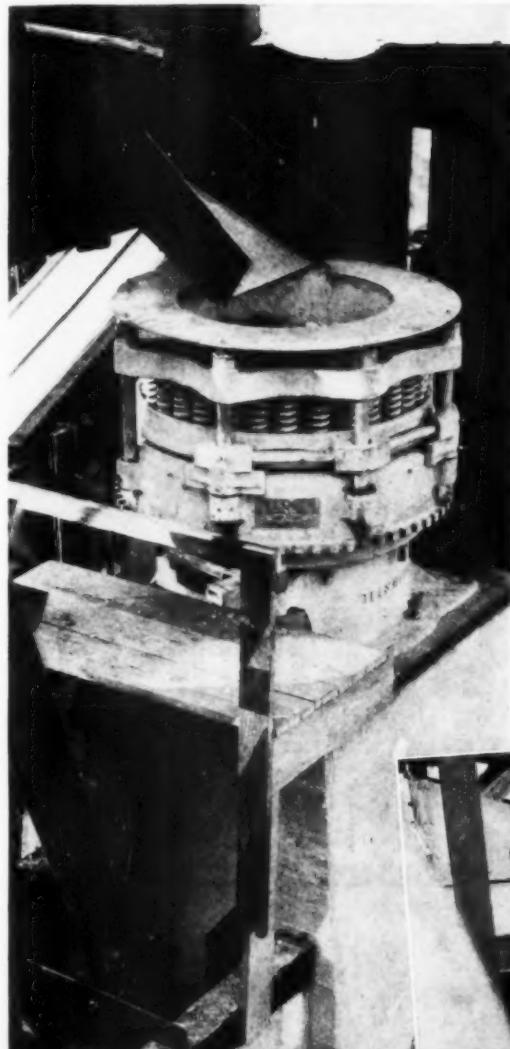
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## is PROFIT EQUIPMENT FOR THE MUSKOGEE GRAVEL COMPANY



In a gravel plant, performance depends on equipment . . . profits depend on costs. The Muskogee Gravel Co., Muskogee, Oklahoma, has operated its Telsmith plant for over a year. "It has always performed satisfactorily in every way," says Manager A. O. Walker. "Maintenance has been at a minimum, and we are very well pleased with the operation and production costs.

"We are especially well pleased with the improved type Gyrasphere Crusher . . . it is showing very little wear or depreciation." This, in spite of a very wet feed—the supreme test of effective sealing and lubrication! For intermediate and fine crushing, it crushes faster, with less power, turning out larger tonnage and a finer product. Like a mortar and pestle . . . only inverted for easy discharge . . . the spherical head and its corresponding concave catch and break chunks of rock between two multi-curved surfaces—a perfect cubing action. Write for free Bulletin Y-34.

In this plant, a Telsmith Pulsator screens sand, gravel and crushed rock, wet or dry, and does it right. Its circular movement produces a maximum screening action that's uniform on every inch of the wire regardless of load. The toughest alloy steels, anti-friction bearings and special seal protection for working parts give it longer life and lower up-keep. Get the details in free Bulletin V-34.

Telsmith complete pit or quarry plant service is described in free Bulletin E-34.



MC-11-39

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ASPHALT DIVISION • ROBINSON ILLINOIS

# Road-Mixed Runways For City Airport

## Los Angeles Builds New Stabilized Surface on Adobe Base, Using Local Material and Emulsion

(Photo on page 1)

RECENT improvements to the large municipal airport at Los Angeles, California, include the construction of a paved surface for Runway A which is approximately 4,700 feet in length and 300 feet in width, together with various other surface and subsurface improvements exclusive of buildings. This runway, with the proposed additional runways and taxiways included in the complete development of the field, will provide facilities for the use of the largest transport planes. The field is approximately 640 acres in area and eventually will have five runways, two of which will be 300 feet in width and the others 200 feet in width.

### The Problem: Adobe and Moisture

The great problem in the construction of the runways at the Los Angeles Airport was to provide a stabilized paved surface upon the natural adobe subgrade, and the exclusion of excessive moisture from this subgrade so that its expansion by absorption of water would not disturb the paved surfaces. The adobe is a very fine material with about 80 per cent passing a 200-mesh sieve. The method finally adopted was to stabilize selected sandy materials existing in the vicinity of the site of the work, and to exclude excessive moisture from the subgrade by the construction of triangular shaped curtain walls along the edges of the runways. Adequate surface drainage was also provided.

### Asphalt Emulsion for Road Mixing

The use of asphalt emulsion for roadmix work has increased greatly in the West as was brought out forcibly at the Asphalt Conference at Los Angeles in February. The reason for the better results with this material in road mix in these sections than in the more humid central states is undoubtedly due to the more rapid evaporation of the water from the mixture in the arid sections.

For the work at the Los Angeles Airport a contract was awarded to the American Bitumuls Co., L.o.b., its plant about one mile from the field. Then a contractor was given the job of hauling the material to the field in large tank trailers. The hauling contractor pumped the material into a storage tank at the field and then diluted the emulsion in the trucks with 2½ parts of water for delivery to the trailer of the Madsen Road Pug.

### Preparing and Mixing Runway Base

Since the adobe at the field was not suitable for the road-mix runway it was fortunate that sufficient sandy material meeting the specifications was available in dunes within the site of the airport. It was the original plan to remove suffi-

cient selected material already placed on the runway and stockpile it at the sides for use as a surfacing material. This plan was abandoned and the existing surface material was mixed with added selected sandy material from other parts of the field and used to make a 4½-inch road-mix base when compacted. This material has about 32 per cent passing a 200-mesh sieve, and none retained on a 10-mesh sieve. The selected material was windrowed so as to give 3¾ cubic feet of material per running foot of windrow. The windrow was about 5 feet wide and 15 inches high with a natural slope at the sides.

The specifications required a Madsen Road Pug or equal, and a Madsen unit was used. This consisted of a crawler frame carrying a twin shaft pug mixer,

the first or front paddles of which dry mix the material before the required amount of emulsion is sprayed into the mass and mixing is continued until the advance of the machine discharges the mixed material in a windrow at the rear. A pair of gathering moldboards at the front move the material into the path of the pug and are raised or lowered to the grade by hydraulic controls at the front of the machine. The front of the machine is carried on a pair of pneumatic tires while the body and greatest weight is carried on the long crawlers. The pug of the Madsen machine is powered by a Caterpillar D13,000 engine while the traction for the entire machine and the pulling of the heavy tank trucks is furnished by a Ford V-8 85-hp engine.

The traveling pug pulls a truck behind it with a rigid drawbar and a reciprocating pump geared to the track, thereby automatically governing the rate of application of the asphalt, which can be still further controlled as to standard rate by a change in the variable stroke of the pump piston delivering the emul-



C. & E. M. Photo  
The Madsen Road Pug Turns to Swallow Another Windrow

sion to the spray nozzles. The pug mixed an average of 2,400 tons of the selected aggregate and 90,000 gallons of the

(Concluded on page 38)

# DOUBLE the POWER to halve the cost



When veteran LeTourneau users, Granfield, Farrar and Carlin, turned to pusher scrapers on Oakland's (Calif.) Skyline Drive, they made sure their costs would be the lowest. First, they learned actual *pay load* capacity of their 20-yard Carryall was several yards greater than that offered by any other so-called 20-yard scraper . . . that with this extra capacity and loading ease more yards per hour were placed. Second, that with this performance, *net cost per yard is cut to half* of 12-yard scraper operation. Third, LeTourneau Carryalls are the only scrapers that will stand up under this digging in boulders, hardpan and shale, then mud and gumbo and spread in measured, even layers, with the aid of the "bowl-polishing," positive ejector tailgate . . .

... then, subcontractor "Duke" Clements doubled the power on his Extra-Heavy Duty Rooter—of radically new digging design. In almost solid rock it gave perfect breakage for low-cost LeTourneau Dozer and Carryall removal—at a fraction of drilling and shooting costs. The natural digging suction of all LeTourneau blades can be compared with that of the Rooter . . . the evidence sticks out like this on every LeTourneau job.

The world's most complete line of modern earth-moving equipment: Carryall\* Scrapers, from 3 to 30-yards . . . Dozers for D4 to D8 tractors . . . Rooters\*, standard, heavy and extra-heavy duty . . . Power Control Units, Buggies\*, Drag Scrapers, Pushdozers, Sheep's Foot Rollers, Cranes, Tree-dozers. \*Name Reg. U. S. Pat. Off.

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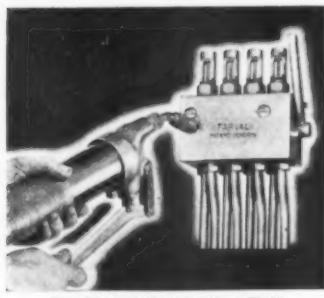
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in every state sell the Fulton line.  
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are good and their prices are  
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The Farval Lubricating Unit

### Lubricating System For Small Machines

A new system for lubricating small machines or a few bearings on large machines from a single grease outlet has been announced by The Farval Corp., Cleveland, Ohio. The new Farval unit consists of a multiple measuring valve block with a single inlet port and from two to eight lubricant outlets per port. As many valve blocks as are necessary to lubricate all the bearings on a machine can be installed and connected in series. The positive pressure lubrication of every bearing is accomplished by connecting a conventional type of hand or power grease gun to the grease nipple at the inlet port and moving the return valve handle.

Movement of a tell-tale indicator stem attached to each valve piston shows the oiler that each bearing has received its measured amount of lubricant. The amount delivered to any pair of outlets is individually adjustable and not a bearing is missed, according to the manufacturer.

#### Soil Stabilization

"Soil Stabilization with Tarvia" is the title of an interesting and well-illustrated booklet, issued by the Barrett Co., 40 Rector St., New York City, on the advantages of soil stabilization and the methods to be used with Tarvia as the stabilizing agent. The illustrations include the various pieces of equipment for this type of construction and the steps in the procedure, as well as before and after pictures of highways so treated.

Copies of this booklet may be secured by contractors and state and county highway engineers direct from the Barrett Co. or from CONTRACTORS AND ENGINEERS MONTHLY.

## SHUNK



### D-K SPREADER AND FINISHING MACHINE AND BITUMINOUS PAVER

- Lays any type mix, hot or cold
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THE SHUNK MFG. COMPANY  
BUCKYRUS, OHIO, U. S. A.

### Clutch and Brake Facings of Metal

Two of the most vulnerable parts of any kind of contracting equipment are the clutch and brake linings. Contractors realize too well the grief of equipment laid up for repairs. A bimetallic friction material for clutch and brake applications has been developed by the S. K. Wellman Co., 1381 E. 49th Street, Cleveland, Ohio. This Velvetouch Bimetallic is a unique product composed of powdered metals welded to steel plates. One form has the layer of powdered material on one side of the steel only and the other has the powdered metal friction material on both sides of the steel.

The single surface type when utilized for clutch or brake service is, as a rule, attached by flat head steel rivets countersunk into the steel plate and with their heads at the meeting line of steel and friction material. This permits the utilization of the entire thickness of the friction material for wear. The sand-

wich type is used in both multiple disc clutches and brakes and in other applications where it is supported in any conventional manner. The single surface type can be formed for brake bands or clutches after fabrication with the friction side either in or out.

Unusually long wear and stability are claimed for Velvetouch Bimetallic and it is also a good conductor of heat, which makes it usable in a wide variety

of designs for brakes and clutches on the heaviest type of machinery. Form 1139, which may be secured direct from the S. K. Wellman Co., describes the applications of Velvetouch Bimetallic friction material for replacement on a wide variety of construction equipment.

Is your equipment obsolete? Read the announcements of new equipment in this issue and write for further information.

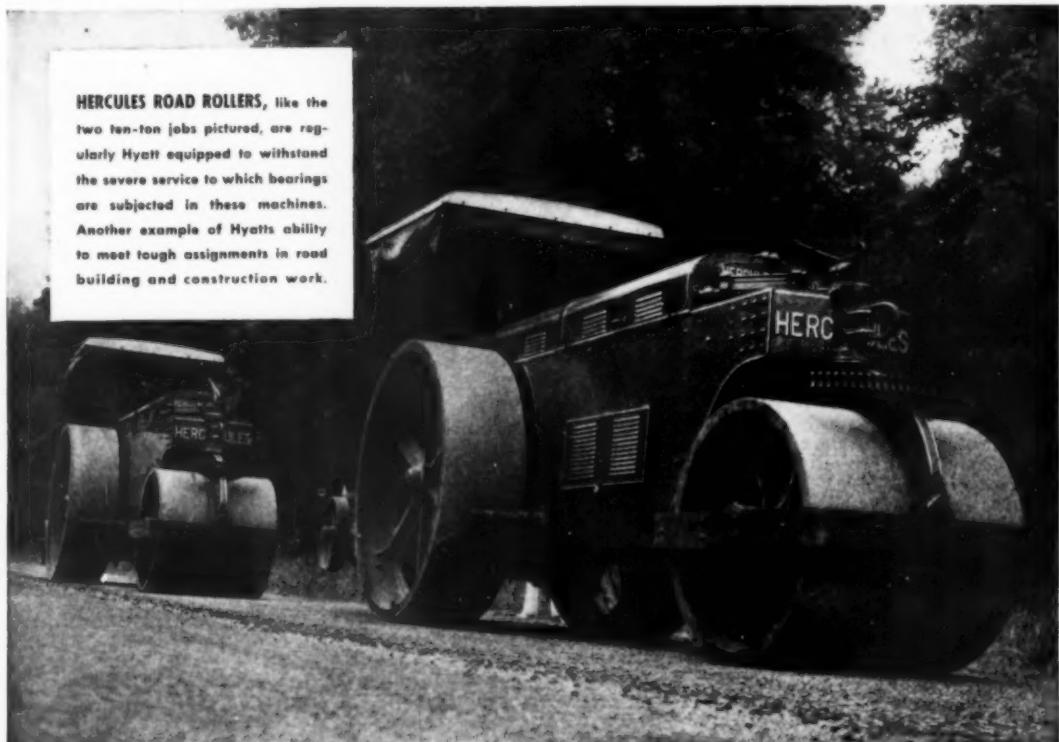
### 3724 LIN. FT. IN 10 HOURS

This remarkable paving speed was accomplished by Vincent Schiavi at Indianapolis—using a "FLEX-PLANE" wide screed finishing machine—the average time for the job being 281.25 feet per hour. Width of pavement 10 feet—Dual Drum Mixer used. "FLEX-PLANE" equipment earns profits.

FLEXIBLE ROAD JOINT MACHINE CO.  
WARREN, OHIO



HERCULES ROAD ROLLERS, like the two ten-ton jobs pictured, are regularly Hyatt equipped to withstand the severe service to which bearings are subjected in these machines. Another example of Hyatt's ability to meet tough assignments in road building and construction work.



*Toil...* BUT NEVER TROUBLE...  
FOR HYATTS

Toil, however punishing, never spells trouble for Hyatt Roller Bearings. These durable and precisely built bearings maintain their efficiency, and the efficiency of related mechanism, under the most grueling conditions of speed, stress and shock.

To the equipment builder they bring better design and manufacturing

economies—to the equipment purchaser, longer machine life, more dependable operation and marked savings in maintenance. All hands benefit where and when Hyatts are used. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Pittsburgh, Detroit and San Francisco.

HYATT *Roller* BEARINGS

## Mass. Mowing Methods Cut Maintenance Costs

(Continued from page 1)

looks and safety in summer and winter and cannot be neglected.

### Some Short Cuts Used

Before we describe the gang mower system used on Routes 9 and 122A in the Worcester District we wish to record a few other short cuts that are used. All slopes on high banks must be grassed in some manner to bind the surface against constant erosion by every rain. It is the practice now where possible to seed every slope on each new contract and in general the slopes are flatter than in the old days. That makes the future of the maintenance man look brighter, but it does not take care of the slopes that were left before roadside development funds were available for seeding.

Almost miraculously these older slopes in the Worcester District have become covered with a sturdy growth of hardy grass. How? It is really simple! Maintenance crews are just as tired of getting out after every rain to do over and over again the same old job of removing tons of debris from the pavement as those higher up are of ordering them out to do the work. Now the program is to acquire every square foot of sod that can be located and moved honestly, and place it on slopes where it will do the most good in preventing wash. The 150-foot face of a huge cut at Palmer, Mass., on U.S. 20 has been treated in this manner and resulted in the elimination of one of the most troublesome maintenance problems of the District.

Last autumn another bad slope was tackled as a WPA project. A high cut at Oxford, Mass., also on Route 20, is now buttressed at the foot with a rubble stone masonry wall and the slopes sodded to end the erosion of the surface and thus prevent the creation of a hazard to traffic after each storm.

### Motor Mowing

In a summer such as that of 1938 the mowing of center strips and shoulders is trying, for Nature was all too abundant with weather that produces huge hay crops. In the Worcester District under normal conditions the small grass-cutting crew can make a circuit of the District in 10 days, if it does not have to stop and rake the cuttings. If the growth is small enough to permit leaving the clippings as a mulch to protect the roots all is well. Last year, however, grass grew like weeds and weeds shot up like skyrockets, hindering proper maintenance cutting. Work was centered on the main routes to keep them attractive and others were necessarily neglected till the end of the season when the motor scythes were sent out

to cut all weeds and grass to prevent snow drifts along the shoulders.

The main cutting of center strips on boulevard highways is done with 72-inch motor-driven gang mowers having four rotary blades. The two outer wing blades are hinged and are lifted when loading or moving the mowers from place to place. Two of these Locke lawn mowers can be carried in a single light delivery truck manned by the two operators. The mowers are loaded into the truck by placing two planks from the ground to the bed of the truck and running the mowers up under their own power. They are unloaded in a similar manner. To run the mowers down the granite edgestone at the ends of the strips where there are crossings and up again onto the next strip, a pair of irons is used which furnish sufficient traction for the mowers to make the grade easily.

Two different methods of operation are used in cutting various sections. On Route 122A, where the distance is relatively small and the center raised strip

is uniformly 9 feet wide, the pair of mowers is unloaded at the center of the stretch to be mowed and the men start in opposite directions, returning to the starting point by noon. The 72-inch swath cut by the mower makes it possible to do the cutting in one round trip.

The big job in the District is the 13 miles on the Worcester-Boston road, Route 9. Here 11½ miles of the center strip is 10 feet wide and the remaining 1½ miles is 30 feet wide. Without cutting the edges and without trimming off the obstinate tough weeds that are not cut by the mowers two men can cut the entire 13 miles in two days. They have to omit the close cutting around bushes planted at the ends of strips where there are cross-overs, and around warning and direction sign standards. They unload the mowers at one place and start along together. Before they have gone too far for one man to walk back, he leaves his mower and returns for the truck, driving it somewhat ahead of the other man. He then returns and continues with his mower. The next time the second man

goes back for the truck and moves it ahead. Thus when they reach the noon-time stop and the end of the day their truck is with them and all that is necessary is to load the mowers into the truck and return to headquarters.

A single man with a "hockey stick," a sort of short one-handed scythe, can do the trimming of the edges and around the bushes and posts in one day on this same strip. During the summer of 1938 there was a luxuriant growth of grass and weeds between the bottom of the edgestone and the concrete pavement. The removal of this growth with a special hook required one man several days.

### Making Roadside Work Pay

Roadside development or beautification is justified in this present economic era only under two conditions: first, if it actually reduces the cost of maintenance of the section in which the work is done; and second, if the road is being built chiefly as a scenic route where the beauty of the landscape is of pri-

(Concluded on page 34)

**EVIDENCE OF MARION'S Proven PERFORMANCE**

**A. GUTHRIE AND CO., INC.,  
ST. PAUL, MINN.  
HAS BOUGHT  
55 MARIONS  
SINCE 1902**

**MODERNIZE with**

**MARION**

**SHOVELS • CRANES • CLAMSHELLS • DRAGLINES  
PULL SHOVELS • From  $\frac{3}{4}$  cubic yards up**

Write the MARION STEAM SHOVEL COMPANY, MARION, OHIO, U. S. A., for Bulletin describing the size of Marion you are interested in, and a copy of the latest GROUND-HOG.

### USE RIGHT BUCKET FOR THE JOB

Hayward makes all four—clam shell, dragline, electric motor, orange peel. A Hayward recommendation is unprejudiced.



THE HAYWARD CO., 32-36 Day St., New York  
**Hayward Buckets**



The Killefer Revolving Ripper

### Tractor-Drawn Ripper For Rocks and Roots

Two-wheel rippers with five points, built with structural steel frames, weighing from 2,200 pounds to 4,130 pounds, and designed for 25 to 60-hp tractors are a part of the line of Killefer Mfg. Corp., 5525 Downey Road, Los Angeles, Calif. The standards are spaced 12 inches apart, and have a 12-inch penetration. This is effective in breaking material, is best for the tools which follow, and is about all that a tractor can pull in ground that actually requires ripping, according to the manufacturer.

The standards are bolted between two heavy angle-irons with three large bolts holding the standards in a vise-like grip. These rippers are equipped with a simple one-rope control lift mechanism and an adjustable hitch for high and low drawbars. Each tool is designed for sharp turns without fouling the tractor, and both regular and special hard rock points are available.

A complete description of the Killefer ripper is found in Bulletin DA-88 and information on Killefer rotary scrapers is found in Bulletin DA-89, which will be sent free on request to those mentioning this item.

### Highway Illumination

The report of the Problem Committee on Highway Illumination of the Committee on Safe Highways, which was presented at the Annual Convention of the American Road Builders' Association in San Francisco in March, has just been published by the Association as Bulletin No. 57.

Although a substantial reduction in traffic accidents and fatalities were reported during 1938, the Committee was unable to secure accurate and complete data on the decrease in after-dark traffic accidents. However, the report contains a review of the general situation and some interesting statistics from states where such data are available.

Copies of this Bulletin No. 57 may be secured by those interested direct from the American Road Builders' Association, National Press Bldg., Washington, D. C.

### PILE HAMMERS and EXTRACTORS HOISTS-DERRICKS WHIRLERS

Special Equipment  
Movable Bridge Machinery

Write for descriptive catalogs.

**McKERNAN-TERRY CORP.**  
19 Park Row, New York

Distributors in Principal Cities

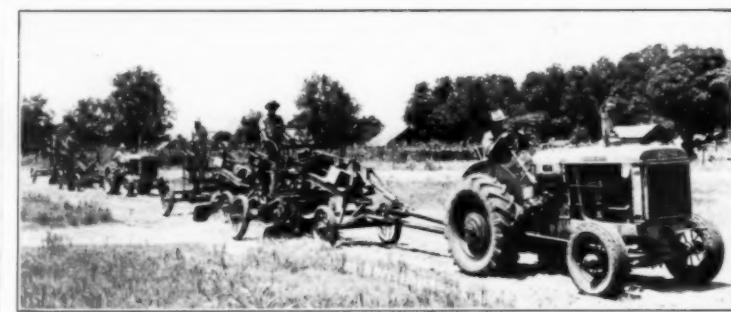
### Maintaining Roads In Georgia County

In Mitchell County, Georgia, two large wheel tractors equipped with low-pressure tires and pulling 8 and 10-foot blade graders in tandem maintain the 1,600 miles of highway in the county system. With one tractor following the other as shown in the illustration, the entire road is given a careful working on one trip through. All main county roads are worked thus at least every six weeks.

The tractors are Model I-40 International 6-cylinder units with a maximum horsepower of 58 and forward speeds of 2, 3 1/2, 7 and 11 1/2 miles an hour.

### New Belt Idlers

Series 43 belt idlers, recently developed by The C. O. Bartlett & Snow Co., Cleveland, Ohio, combine proved dependability and low first cost, according to the manufacturer. They are



Mitchell County's Wheel Tractor and Grader Outfits Maintaining One of the County's Gravel Roads

equipped with self-cleaning bases and the support brackets are assembled in jigs, thus assuring proper alignment and correct spacing. Slotted holes are provided in the mounting plates to permit making adjustments in aligning the belt. The idler rolls are machine-faced on the ends and pressed onto the shoulders of the cast roll ends, the outer edges

of which have been rounded and smoothed to prevent injury to the belt. Bartlett-Snow labyrinth grease seals protect the free-running anti-friction bearings and a through grease tube is provided from one bearing to the other.

Bulletin No. 80, describing these idlers in detail, may be secured by those interested direct from the manufacturer.

# DITCH



Model 120 . . . cuts trench 18" to 42" wide and to 12' 6" deep. Similar to Model 120 but larger and heavier. It handles 75% of all ditching jobs.



Model 12 The "Pipe Liner" Wheel Type Ditcher for fast going and long runs of trench 15" to 24" wide and to 5 1/2" deep. Buckeye originated the wheel-type ditcher, and more Buckeyes are in operation than all other makes combined.



Model F Backfiller . . . it completes your profit making equipment for ditching jobs. Fast, easily maneuvered . . . weighs only 4 tons.



Trailers . . . for quick transportation of any Buckeye machine . . . or other construction equipment.

### Buckeye DITCHERS



Model 120 Service Ditcher . . . the money maker for small sewer and water line jobs . . . 18" to 30" wide to 11' 6" deep . . . shiftable boom . . . cuts to within 4 inches of curbs . . . easily maneuvered and transported.

**THE BUCKEYE TRACTION DITCHER COMPANY**  
FINDLAY, OHIO  
MANUFACTURERS OF  
CONVERTIBLE EXCAVATORS • BACKFILLERS • TRAILBUILDERS • SCRAPERS  
BULLDOZERS • RIPERS • TRACTOR POWER CONTROL UNITS

PLEASE SEND COMPLETE INFORMATION AND PRICES ON  DITCHERS  BACKFILLERS  TRAILERS

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Originals  
of the  
wheel type  
DITCHING  
MACHINES

**EARTH HANDLING AND ROAD BUILDING EQUIPMENT FOR OVER 40 YEARS**

**Dragline Bucket Bulletin**

Page automatic dragline buckets, in a size and weight for every type of dragline and dirt-moving job, are described in Bulletin A-1, copies of which may be secured direct from the Page Engineering Co., Clearing Post Office, Chicago, Ill., by mentioning this magazine.

The three types of Page dragline buckets include the RM for light excavation such as lever work, rehandling, and use in soft surface soils which can be loaded without plowing; the RC for general excavation, and particularly for

digging material which is partially cemented or compacted, and for the less difficult and non-abrasive soils; and the RH which is built for more difficult excavation such as shales, blasted rock, hardpan and abrasive materials. All three types are of sturdy construction, designed to meet the requirements of the work for which they are designed, and have the Page patented rounded front design.

Solid-type tooth points of wear-resisting steel are used on the RM automatic buckets, although reversible renewable points are available if desired.

Tooth points of cast manganese steel of the reversible renewable type are furnished as standard on the RC and RH buckets.

**Air Tools and Steel  
For Hard Road Work**

A complete line of pavement breaking and clay digging tools made to fit any standard compressed air hammer and including a complete line of rock drill steels, as well as numerous hand tools for cutting and finishing stone and concrete, is made by Vulcan Tool Mfg. Co.

41 Liberty St., Quincy, Mass. This manufacturer specializes in tools made of the right steel properly forged and heat treated to meet the exacting requirements of compressed-air-powered work.

The latest Vulcan catalog describes the line of moil points, digging chisels, chisel bits, asphalt cutters, heavy clay spades, sheathing drivers, frost wedges, round and square tampers, solid drill steels, detachable bit rods and other specialties. Copies of this catalog may be secured free on request by writing to the manufacturer and mentioning this item.

# "CATERPILLAR" LEADS AGAIN

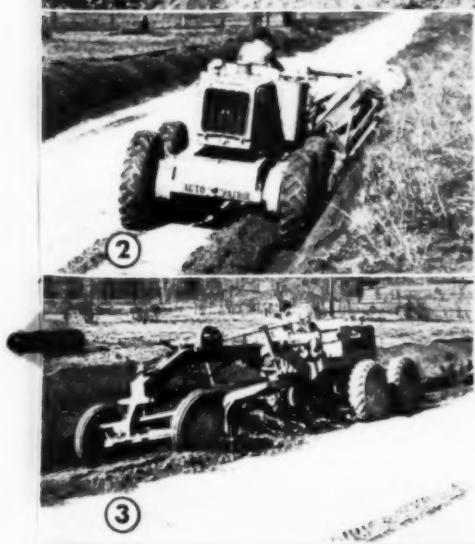
... WITH A

## NEW, ALL-PURPOSE MOTOR GRADER!

ANNOUNCING THE "CATERPILLAR" No. 112



1



2

1 Offset on blade-beams, the blade of the new No. 112 Motor Grader can extend 6 feet, 5 inches beyond the line of the wheels to pick up large windrows of material.

2 The blade of the No. 112 Motor Grader can be changed from full ditching position to high-bank cutting position in less than a minute! If necessary, the blade can go to a 90-degree vertical angle. From that maximum slope and height, you can change the blade-position to meet almost any bank job.

3 The No. 112 Motor Grader ditches while traveling in reverse. Its full-revolving blade can be turned from forward to reverse in less than 30 seconds! This means you can go back and forth on mixing and subgrading jobs—and in narrow quarters—with-out turning the machine around.

**CHOICE OF 4-CYLINDER, 46-HORSEPOWER GASOLINE OR DIESEL ENGINE**

If you are familiar with the large, powerful "Caterpillar" Diesel No. 12 Motor Grader, you already know something about the efficiency, versatility and work-capacity of this new machine. Because the No. 112 Motor Grader is simply a smaller edition of the popular No. 12.

As a builder and finisher of roads and streets, the No. 112 will undoubtedly establish new records of economy, time-savings and coverage. It has four forward speeds and one reverse speed. Blade-positions are practically *unlimited*. Lift above the ground is 15 inches... side shift

is 3 feet... maximum bank-cutting angle is 90 degrees... and the blade can be turned *completely* around!

Combine that blade-range with the driving traction to make it effective—and consider the variety of useful attachments that can be used with this machine—and you'll see that the No. 112 is capable of handling an *entire* road job, from bank to bank.

For the sake of your profits, you ought to know more about this new motor grader—*right away!* See the nearest "Caterpillar" dealer, or write direct for further information.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

**A QUICK LOOK AT THE NEW "CATERPILLAR" No. 112 MOTOR GRADER**

**WEIGHT**—17,800 lbs. (Diesel) • **B.H.P.**—46 (Diesel or Gasoline)  
**WHEELBASE**—18 feet, 9 inches

**BLADE-POSITIONS AND CUTS**

—Ample clearance at the front and rear; toe of blade can work directly behind the front wheel. Fully revolving. Can be set at a 90-degree vertical angle. Makes ditch cuts... high-bank cuts... flat-bottom ditch cuts... low-bank cuts. Blade can be trailed for finishing slopes.

Wide reach: can be extended 6 feet, 5 inches beyond the line of the wheels.

**TRACTION**—Entire engine-weight centered directly over driving-wheels. Slippage is at a minimum, traction at a maximum... the No. 112 Motor Grader has more blade-pressure than any motor grader could possibly use at any speed.

**STEERING**—Exceptionally easy and accurate—through the use of a specially designed steering-gear with roller contacts.

# CATERPILLAR

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

# LINK-BELT and NOW LINKED for

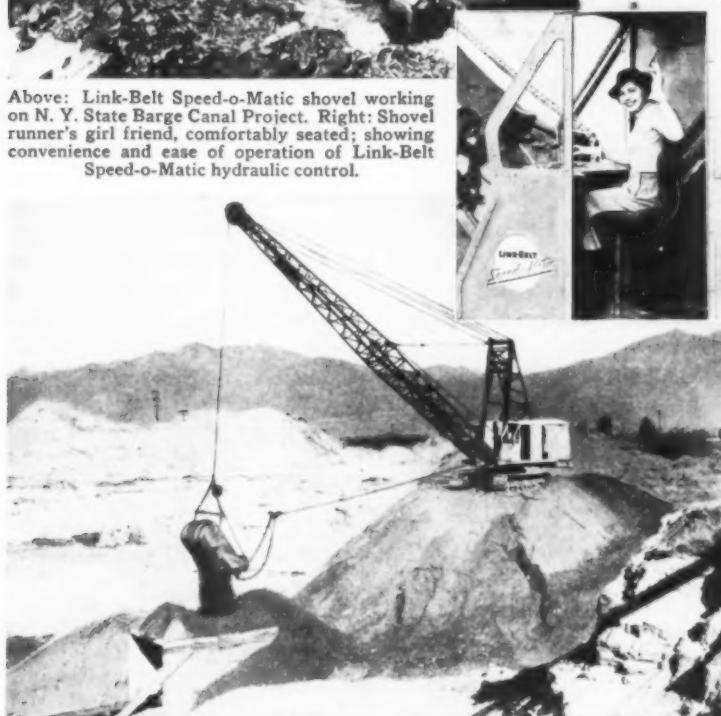


Alfred Kauffman, President,  
Link-Belt Company.

Two great manufacturing companies...two outstanding lines of excavating and handling equipment...two highly efficient engineering and service organizations are now joined under one banner. This brings to users of both small and medium size machines the combined service and parts facilities, as well as the engineering and manufacturing resources and experience of these two great organizations.



Above: Link-Belt Speed-o-Matic shovel working on N. Y. State Barge Canal Project. Right: Shovel runner's girl friend, comfortably seated; showing convenience and ease of operation of Link-Belt Speed-o-Matic hydraulic control.



Link-Belt Speed-o-Matic dragline handling sand and gravel from pit to belt conveyor.

## LINK-BELT COMPANY

300 W. Pershing Road, Chicago      Cable and Radio Address: Linkbelt  
Offices and Distributors in Principal Cities

### THE LINK-BELT LINE

The Link-Belt line of heavy-duty crawler-mounted shovels-draglines-cranes, comprises machines of  $1\frac{1}{4}$  cu. yd. to  $2\frac{1}{2}$  cu. yd. capacity.

These machines, designed for gasoline engine, Diesel engine, oil engine, or electric motor drive, are equipped with Link-Belt Speed-o-Matic hydraulic-pressure control, with short, fast, easy-throw levers.

Speed-o-Matic control eliminates operator fatigue and tremendously speeds-up operation, resulting in greatly increased output as compared with machines of corresponding size having mechanical levers.

Like the Speeder line, each of these Link-Belt machines is an easily convertible, all-purpose unit, serving as a shovel, a crane, a dragline, a trench hoe, etc. This ease of convertibility is a valuable feature, as it reduces the owner's investment in equipment to a minimum, without limiting the range of work possible.

The Link-Belt line also includes a full range of sizes of locomotive cranes, which are most commonly used in 8-wheel standard-gauge track-type, but can also be furnished in 4-wheel and wide-gauge types. Link-Belt also builds stationary cranes, gantry cranes and pier cranes, to meet special conditions, as well as long-radius cranes, with wide-gauge single or double track trucks, to meet conditions beyond those for which the standard-gauge cranes are designed.

Link-Belt Company has been building locomotive cranes for the last 40 years, and was first to build a locomotive crane especially designed for internal combustion engine drive. Until the company developed its "L" type machine, locomotive cranes had been designed only for operation with either steam engine or an electric motor.



Link-Belt "L" type gasoline-engine-operated locomotive crane unloading sand and gravel with clam shell bucket.

**Speed-o-Matic**  
SHOVEL-DRAGLINE-CRANE— $1\frac{1}{4}$  to  $2\frac{1}{2}$  YD. CAPACITY

# Link **SPEEDER** GREATER SERVICE

The "Speeder" line of  $\frac{1}{2}$  to 1 yd. power operated shovels-draglines-cranes is now added to Link-Belt's Speed-o-Matic line of  $1\frac{1}{2}$  to  $2\frac{1}{2}$  yd. machines. The Shovel Division of Link-Belt Company consolidated with the Speeder Machinery Corp., will be under the direct management of Mr. T. M. Deal, and will be operated as a separate and distinct unit of our business.



Troy M. Deal, President,  
Speeder Machinery Corporation

## THE SPEEDER LINE

The speeder line of light-weight convertible shovels, sold and serviced by reputable dealers in all parts of the world, includes the following:

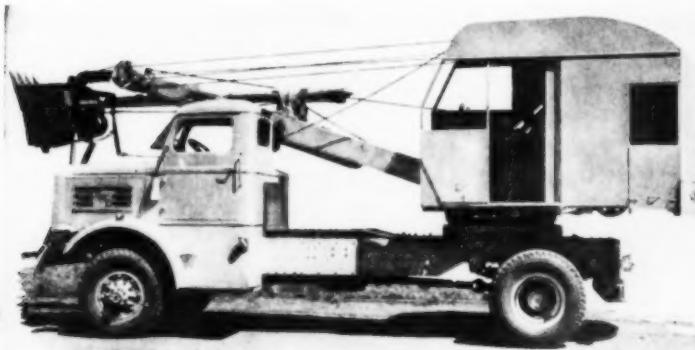
- Crawler-mounted machines of  $\frac{1}{2}$  to 1-cu. yd. capacity.
- Truck-mounted machines of  $\frac{1}{2}$  to  $\frac{3}{4}$  cu. yd. capacity.
- "Caterpillar" Tractor-mounted machines of  $\frac{1}{2}$  cu. yd. capacity.

Each of these machines is a fully convertible unit. It may be fitted as a shovel; trench hoe or pull shovel; dragline; crane with hook block or clam shell; pile driver; or skimmer scoop—without requiring any mechanical changes, aside from substitution of cables and drum lagging.

Crawler mounted shovels are extensively used in road-building, and various kinds of excavation, including basement work. With dragline attachments and wide crawlers they are ideal machines for ditch cleaning, sand and gravel excavation and small lake dredging. State, County and Highway Departments, Drainage Districts and other Governmental Departments, find many varied uses for these small, convertible excavators.

Truck-mounted cranes and shovels are very mobile units for small scattered jobs of steel erection, material handling and excavation.

Also included in the line are Speeder Trailers, of platform or skeleton type, with 4 or 6 wheels, pneumatic-tired, for moving Speeder shovels and other machines quickly and economically from one job to another.



A Speeder truck-mounted shovel, full revolving, fully convertible.



Speeder crawler-mounted shovel operating in a Missouri rock quarry.



A "Caterpillar Tractor" mounted Speeder convertible shovel—a machine with unequalled utility, since it combines a Caterpillar tractor and Speeder convertible shovel in one unit while retaining all the advantages of both the tractor and the shovel. The machine operates equally well with dragline, crane, pile driver, clam shell or other commonly used attachment.

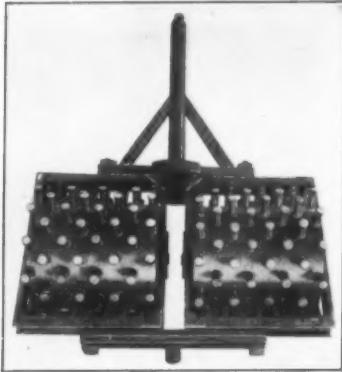
**SPEEDER MACHINERY CORPORATION**

Cedar Rapids, Iowa

Cable and Radio Address: Speedr

# **SPEEDER**

**SHOVEL-DRAGLINE-CRANE  $\frac{1}{2}$  to 1 YD. CAPACITY**



The Grace Sheepsfoot Roller

### Sheepsfoot Tamers Of Variable Weight

The sheepsfoot roller is an important tool in all types of soil stabilization and on earth fills where compaction from the bottom up is desired. More uniform compaction to a greater depth is provided and, in stabilized base work, the rodding and penetrating action of the feet, in addition to compacting, promotes mixing and accelerates drying time.

The W. E. Grace Mfg. Co., 1819 Chestnut St., Dallas, Texas, manufactures a two-drum roller 9 feet 9 inches wide with 48-inch wide drums pivoted to oscillate independently of each other. The 64 or 112 tamping feet on each drum are of special steel, flared at the base and welded to the drums. Individual cleaner bars mounted on the rear of the frame prevent packing of dirt or rocks between the feet. Uneven spacing of the feet, still leaving adequate space for the cleaner bars, prevents the feet tracking over a previous pass. This insures even compaction and helps eliminate the possibility of unpacked spots after several passes. Large Hyatt or Heliiflex roller bearings interchangeable with Fordson tractor rear axle bearings make for quick replacement in the field.

The pressure applied to the soil by the feet with the drums empty is 103 and 113 pounds per square inch and when filled with water 195 and 205 pounds. Complete details, including prices and specifications, may be secured direct from the manufacturer by mentioning this item.

### Diesel-Electric Generators

Complete units consisting of Caterpillar diesel engines direct-connected to leading makes of direct or alternating-current generators are described in a new booklet, Form 4658, recently issued by the Caterpillar Tractor Co., Peoria, Ill. Many actual installations of these

generators, from 20 to 80 kilowatt capacity, are pictured, and fuel and operating costs, quoted from owners' records, are included. Copies of the booklet can be obtained without cost direct from the manufacturer, or from this magazine.

### Service Equipment Catalog

A new 40-page book on practical servicing equipment for automotive repair shops has just been issued by the South Bend Lathe Works, South Bend, Ind. Many pages of illustrations are included and there is information on all-purpose lathe equipment as well as the latest servicing methods on valves, armatures, pistons, connecting rods, etc. A copy of this book, No. 64, may be obtained from the South Bend Lathe Works without charge by mentioning this item.

*Is your job ever held up because of break-downs? Keep your equipment up-to-date. Write for information.*

## UNION PILE DRIVING HAMMERS



Two Size No. 1 Union Pile Hammers driving heavy foundation piling at New York's 1939 World's Fair Site

**UNION IRON WORKS, INC.**  
ENGINEERS AND MANUFACTURERS

Sturdy, efficient and economical. One piece frame construction of semi-nickel steel. No bolts in moving parts. Minimum number of parts made of highest quality heat-treated alloy steels.

Complete Pile Driving Plants Designed and Built  
Write for Bulletins

P.O. Box 18  
ELIZABETH, N. J.

*"No use talkin';  
Slim. This baby's  
got what it takes!"*



### CHECK YOUR TRUCK AGAINST THESE QUALITY FORD FEATURES!

**V-8 ENGINES**—95 (available in all Regular and C. O. E. Trucks), 85, 60 hp.—Smooth, dependable, low-cost power. Quality materials and precision workmanship for efficient operation and long life.

**SEMI-CENTRIFUGAL CLUTCHES**—Non-tiring pedal action. Centrifugal force provides tremendous power-transmitting capacity. Up-keep costs kept at a minimum.

**STURDY, TROUBLE-FREE TRANSMISSIONS**—Large roller and ball bearings for all forward

speeds reduce friction, save power. Oil-hardened chromium-steel gears for long service.

**FULL TORQUE-TUBE DRIVE**—Springs relieved of driving and braking stresses provide better cushioning of truck and its load. Shackle-bolt wear reduced, spring life prolonged.

**RUGGED REAR AXLES**—Driving pinion is strand-mounted to maintain gear-tooth alignment. All truck axles are full-floating, with weight carried on axle housing—none on axle shafts.

These features increase dependability and long service, reduce up-keep expense.

**BIG, POWERFUL HYDRAULIC BRAKES**—Equalized braking action for straight stops. Big brake-drum diameters and large lining areas for long brake life and low-cost maintenance.

**In every detail, the quality of all Ford cabs and bodies matches the high quality of Ford chassis. Their exceptional durability means long service with low up-keep cost.**

## NEW 95-HP. FORD V-8 HEAVY-DUTY TRUCK ENGINE

# OSGOOD



### Power Shovels Draglines Cranes, Etc.

Write for New Descriptive Bulletins  
1/2 to 2 cu. yds.

**THE OSGOOD CO.**  
MARION, OHIO

## Old Marl Road Base Rebuilt in Florida

(Continued from page 2)

Caterpillar 10-foot blade on edge and running it down the stakes true to line. The form boards were held firmly by 2-foot stakes cut from 2 x 4's diagonally. The marl was dumped between the forms in the proper quantity and then a Big Roman tandem disk outfit was run back and forth over the material to break up the rock. The material was also mixed by plowing furrows, turning the material away from the center and then back, with the disks working before, during and after the plowing. After the marl had dried out for about two weeks during the disking, plowing and shaping, it was scarified for the top 2 inches and then finished with the blade, roller and wetting by the water wagons as described below. The wagons were filled at one of the marl pits by a Novo triplex pump. After the final shaping of the base began with the pulled Caterpillar 10-foot blade, it was rolled continuously with a 10-ton Galion 3-wheel roller behind a pair of tank trucks with 500-gallon steel tanks and spray bars until a slight slurry of the marl continued ahead of the rolls. This is locally called "slopping" and is technically referred to as "water sealing". Final shaping was done with a Caterpillar Auto Patrol.

After allowing the base to dry thoroughly it was cleaned with a blower mounted on an International tractor that also carried a Detroit-Harvester rotary broom ahead. The blower removed from the surface any fine dust that might prevent the prime from penetrating the marl. The prime was applied by a distributor at the rate of 0.19 to 0.2 gallon per square yard, using a heavy grade of pine pitch. This was immediately covered with sand to prevent pick-up while curing under traffic for 15 to 30 days.

### Applying the Surface

During the curing  $\frac{3}{4}$  x 6-inch planks were laid at the edges of the base and the shoulders worked up to them with the Caterpillar tractor and blade. This gave a  $\frac{3}{4}$ -inch shoulder against which the surface stone was worked and prevented it being easily carried off onto the slopes.

The tack coat consisted of 0.2 gallon per square yard of a semi-solid asphalt. This was covered immediately by 0.5 cubic foot per square yard of Brookville limestone having a screen size from 1 down to  $\frac{3}{8}$  inch. This was hand-broomed and drag-broomed and then rolled with the International tractor that handled the blower and rotary broom and which was equipped with three tires on each rear wheel for rolling the surface course while traffic was excluded from the road. This was fol-

lowed by 0.3 gallon of the asphalt per square yard covered with 0.25 cubic foot of stone between the screen sizes of  $\frac{3}{4}$ -inch and 8-mesh. The quantities were slightly lower for some parts of the work as the rock would not take up the asphalt readily. This completed the surface course when rolled to uniform texture and firmness.

### Ditches and Side Bridges

The ditches were made from 8 to 14 feet wide, requiring side bridges for access to farm roads and houses. Treated-timber bridges were built instead of using corrugated pipe because the full width of the ditches was needed to care for the water which would have overtaxed the smaller pipe sizes and larger diameters would fill with sand.

The side bridges consisted of 6 x 14-inch x 3-foot sills on which 10 x 10-inch caps were placed, carrying eleven 6 x 14-inch joists on 1-foot 10-inch centers. The floor boards, each 20 feet long, were 4 x 8-inch treated timber carrying two 6 x 8-inch curbs bolted through 3 x

8-inch curb blocks to the flooring. These bridges are 16 feet long with 18-foot 3-inch roadways, with all the material being pressure creosoted. Two backing boards at each end, consisting of 3 x 10-inch planks, hold the end fills.

### Quantities

Clearing and grubbing marl pits.....	2.87 acres
Roadway excavation.....	7,532.0 cu. yd.
Stripping marl pits.....	9,530.0 cu. yd.
Overhaul.....	4,580.0 cu. yd.
Tar prime, Material Type 2.....	14,822.0 gal.
Cover material, Brookville rock.....	1,617.0 cu. yd.
Bituminous material, surface treatment 29,644.0 gal	
Class A Concrete (94:210:308).....	310.7 cu. yd.
Reinforcing steel.....	28,710.0 lb.
Treated structural timber, side bridges.....	10.77 MFBM
Base material, marl.....	9,607.0 cu. yd.
Overhaul, base material (overhaul unit was $\frac{1}{2}$ mile per cubic yard after first mile of free haul).....	12,164 OH units
Mixing base material.....	59,288.0 cu. yd.

### Personnel

This 5.0-mile contract was awarded to H. E. Wolfe Construction Co., of St. Augustine, Fla., on its original bid of \$61,735.09 and work was started on November 9, 1937. F. H. Bumpass was Superintendent for the contractor and Winston Carlton was Project Engineer for the Florida State Road Department.

## A New Supercharger For Ford V-8 Engines

In an effort to eliminate power loss on small industrial power units, particularly in high altitudes, the McCulloch Engineering Co., 3227 North 31 St., Milwaukee, Wis., has introduced a new supercharger for users of power units employing Ford 95 hp V-8 engines. According to the manufacturer, chief among the advantages of supercharging is the step-up from 85 to 124 horsepower, thus eliminating the problem of power loss at high altitudes where each 1,000 feet reduces motor efficiency from 3 to 5 per cent. Other benefits include increased torque, a saving in fuel consumption from 7.3 to 19.7 per cent, smoother performance, less engine wear and longer bearing life. Installation is simple and does not affect the motor's basic engineering.

Additional information on this supercharger may be secured direct from the manufacturer by mentioning this item, or from this magazine.



**High Speed Charging** without skip clogging, is an important factor for a **High Speed** operating cycle. The Koehring Paver skip is all-welded, streamlined, built without angles or sharp corners. An unobstructed, wide throat permits almost complete discharge of materials before the skip is in maximum elevated position. Heavy plate construction with replaceable liners assures a sturdy, rigid unit for batch truck loading.

**KOEHRING CO** • Milwaukee, Wis.



Koehring 34-E Twinbatch skip is wide for convenient batch truck loading; and streamlined for fast and clean charging.



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(Gas and Electric)

Concrete Surfacing Attachments



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DISTRIBUTORS IN ALL PRINCIPAL CITIES

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## STANDARD OIL COMPANY (INDIANA)

### AUTOMOTIVE ENGINEERING SERVICE



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By O. E. POTTER

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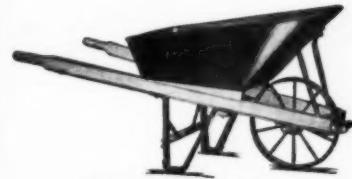
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Motor Graders  
Roll-A-Planes  
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Crushing and  
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Washing Plants  
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# General Motors ushers in A NEW DAY for DIESELS on CONSTRUCTION JOBS

**Simpler even than gasoline engines to operate and service, dogged as steam engines in their ability to "hang on"—GM Diesel Packaged Power units bring you Diesel economies without the usual "ifs," "ands," and "buts."**

**Y**OU know the Diesel's common advantages—its economy, its lack of fire hazard and how it stops fuel pilferage.

But that's only the beginning of the GM Diesel's story. Equally important are its *operating* advantages over gasoline engines, steam engines—and, yes, other Diesels too!

It's a simpler Diesel, for one thing.

Built on the General Motors 2-cycle principle, it fits in about the same space as gasoline engines of comparable

power—may be installed in any of your present gasoline-powered equipment with a minimum change-over. And because every down-stroke in a GM Diesel is a power-stroke—not just every other down-stroke as in 4-cycle engines—there is materially less piston travel and wear.

What's more, it comes in completely engineered *Packaged Power* units of

# GENERAL

from 15 to 90 hp. (continuous rating)—fully equipped for either portable or stationary use, all set to go.

No "experts" are needed to operate the GM Diesel—nor to keep it on the job. No special fuels or lube oils are required in its diet. It performs smoothly, quietly on almost any commercially available fuel oil and without the usual heavy smoke exhaust.

Two new General Motors developments are responsible for that: a Unit Injector and Fuel Pump that ends the need for long, high-pressure fuel lines and improved Uniflow *Blower Scavenging*, which—in one sweep—thoroughly cleans out the burnt gases and refills each cylinder with fresh air.

Here the fuel is evenly atomized for more complete combustion. While at each period of injection, there's positive timing control.

On shovels, cranes, draglines, bulldozers and dump trucks—it answers the demands of variable loads with an alertness and flexibility that even gasoline engines can't match, "holds on" with the tenacity of a steam engine.

And in all construction service—with compressors, pumps, ditchers and

crushers, too—it can be counted on to provide consistent savings, undiluted by those extra service expenses you may have considered Diesel "musts."

For the GM Diesel is purposely built for continuously dependable service in isolated spots as well as those convenient to sources of service and supply—to behave as well for unskilled operators as for the engineers who designed it.

### Simplified Service

It is mass-produced, with standardized, readily replaceable parts that are interchangeable cylinder for cylinder and engine for engine. Thus its life is literally endless, its maintenance reduced to the utmost simplicity.

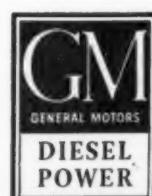
And now a nation-wide dealer organization is ready to demonstrate what GM Diesel Packaged Power can do for you—is doing for others—in making tough jobs easier and all jobs more profitable. Why not write today for the name and address of nearest GM Diesel dealer.

DIESEL ENGINE DIVISION

GENERAL MOTORS SALES CORPORATION

Cleveland, Ohio

# MOTORS DIESEL



## Maintenance Mowing In Massachusetts

(Continued from page 23)

many importance.

There are plenty of examples of the first type of roadside work. We have cited some in the paragraphs above. The sodding of slopes is in the nature of roadside development, for it removes the eyesore of the rough unnatural slope of the cut. If the sodding and some planting of shrubs and trees will prevent the erosion of the slope and the constant cost of clearing the debris from the road after each storm, the cost of the roadside development program is justified. Further, there are instances where some work in paving and sodding ditches and drains off the right-of-way is justified as a landscape project when the work will remove a constant source of expense in the clearing of the drainage ditches along the road proper because of wash.

The Westchester Park Commission has furnished a notable and excellent example of roadside development for scenic purposes on the Hutchison River Parkway, and the State of Connecticut has shown what may be done in healing the cuts and slashes through a new territory by the excellent work its Highway Commission has done in the landscaping of the Merritt Parkway which connects with the Hutchison River Parkway. Connecticut has also shown a more economical type of roadside development on its Route 84 which leads directly from New London to Hopkinton, R.I., eliminating the towns of Groton, Mystic and Westerly. The work here is not as obvious to the casual observer, but the slopes have been laid back flatter than the construction engineer really likes to leave them because it means moving more dirt per mile. The grass has been planted and there have been many outcrops of boulders left and the planting of trees has been casual so that it does not look like a man-made job.

On these three jobs there will be little maintenance problems caused by earth and gravel washing in from the slopes so that a large portion of the cost of the attractive landscaping can be written off in the reduced maintenance costs. It is true that with the increasing sodding and planting of slopes there is a slightly increased cost for the mowing and trimming of the grass and trees and shrubs. While we believe that the money invested in roadside development projects will pay ample dividends in the future through lowered road main-

tenance costs, the cost of carrying on these projects must be taken into consideration at the present time in making up budgets for maintenance departments.

### Personnel

The work in the Worcester District of the Massachusetts Department of Public Works is under the direction of Martin J. Dalton, District Engineer, and E. H. Smith, District Maintenance Engineer.

### New Ransome Dealers

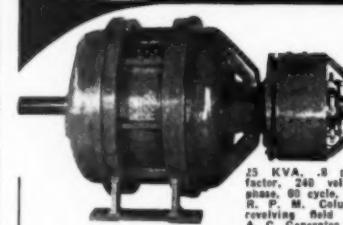
The Ransome Concrete Machinery Co., Dunellen, N.J., manufacturer of concrete mixers, pavers, and truck mixers, has announced the appointment of Earl Walker Co., Inc., Sullivan, Ill., to handle its small mixers, sizes 3½-S to 14-S, in the territory surrounding Sullivan, and O. B. Kramp, Coral Gables, Fla., to handle the complete Ransome line in the counties in Florida surrounding Coral Gables.

### Dewatering Pumps

Especially designed for cofferdam dewatering service, the Worthington vertical turbine pump may be used either as a portable sinker pump to be lowered as water level recedes, or fitted with

suitable column pipe lengths for fixed installation. The features of this compact and simple unit are described and illustrated in a new bulletin, W-450-B25A, copies of which may be secured direct from the Worthington Pump & Machinery Corp., Harrison, N.J.

## COLUMBIA A. C. GENERATORS



SIZES: 1 TO 300 KVA.  
SPEEDS: 1800, 1200, 900, 720, 600, 514, 450 R.P.M.  
SHIPMENT: ONE WEEK TO 10 DAYS.

Driven by Diesel or gas engine, Columbia Generators furnish power and light where current is not available and are used for stand-by service in event of power failure. Compactly built, they are easily portable. Write for bulletin describing their dependable construction.

**COLUMBIA ELECTRIC MFG. CO.** 4510 Hamilton Ave. Cleveland, Ohio



Seattle, U.S.A.  
COMPACT—POWERFUL—SAFE  
"For use where power is not practical or available"  
Manufactured in 2, 5 and 15-Ton Sizes.  
For capacity comparison,  $\frac{1}{2}$ " cable used:  
2-Ton "Lightweight" ..... 75 ft.  
5-Ton "General Utility" ..... 250 ft.  
15-Ton Triple-Gear "Special" ..... 1200 ft.  
Patent instant gear change and positive internal brake that never fails, and will lock load. Price, f.o.b.  
Gross Rate Weight Scales  
2-Ton 4, & 22 to 1 ..... 60 lb. \$ 50  
5-Ton 4, & 24 to 1 ..... 110 lb. \$ 75  
15-Ton 4, 19 & 100 to 1 ..... 680 lb. \$250

**BEEBE BROS.**  
2724 6th Ave., So., Seattle, Wash.  
Warehouses stock for dealers' supply: Seattle, Chicago—Brooklyn—Houston. Complete literature and list of dealers in Principal U. S. Cities and Foreign Countries Gladly Mailed.

... and the road-builder has  
done his share by providing  
"TRACTIONIZED" SKID-SAFE  
TARVIA PAVEMENT . . .



THE BARRETT COMPANY New York Chicago Birmingham St. Louis Detroit Philadelphia Boston Providence Lebanon  
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AMERICA'S LEADING MANUFACTURER OF COAL-TAR PRODUCTS • ROOFINGS • TARVIA • CHEMICALS

## County Has Large Paved Road Mileage

(Continued from page 2)

using WPA labor and county equipment. The work includes acquiring additional right-of-way at large cuts, flattening the backslopes and planting Bermuda grass to prevent erosion. A large mileage of shoulders is being rebuilt, especially on the paved roads, to prevent accidents from vehicles running off the edges onto low shoulders. A total of 350 men are being used on this work, all furnished by WPA, and the county furnishing the trucks and drivers.

### Proposed Toll Bridge

Looking to the future Mobile County has given serious consideration to the erection by contract of a 3-mile bridge and causeway with a draw span having 200 feet horizontal clearance and 75 feet vertical clearance over Grants Pass. The structure would be a creosote-pile bridge with a concrete deck and cost in the neighborhood of \$840,000.

The project has received the approval of the Alabama Bridge Commission which is ready to issue \$900,000 in bonds to be amortized by tolls and guaranteed by the Dauphin Island Land Co. through payment of 20 per cent of the value of all land sold on Dauphin Island, and by the county which expected to use 20 per cent of its gas tax funds each year until the bonds were paid for. The Commissioners of the County expressed a willingness to approve the bridge project but they are legally obligated to use all gas tax money for road construction and maintenance, in accordance with a court decision.

The present status of the proposed Dauphin Island Bridge is that the Board of Commissioners has applied to the Reconstruction Finance Corporation for a loan of \$900,000. This loan is to be repaid by tolls and from part of the profit derived from the sale of lots. The County is now awaiting a reply from the Government as to the outcome of the application.

It is expected that the lands along the shores of Dauphin Island would be the site of a new year-round resort made readily accessible by the toll bridge and with additional access from Fort Morgan to the east by ferry, thus making a circuit. If the proposed toll bridge becomes a reality the county will gain by the state hardsurfacing 15 miles of road which will then be released from county maintenance in addition to the present paved Cedar Point Road to the city limits.

Mobile County at the present time lacks an accessible beach resort and must send its people many miles to other states for such recreational facilities. While there is some slight opposition to the project on the part of small fisher interests, the major feeling is in favor of the toll bridge project as a logical development of the natural recreational resources of the county.

### New Electric Hoist

Quik-Lift is the name of a new electric hoist recently announced by the Coffing Hoist Co., Danville, Ill., which, according to the manufacturer, incorporates a maximum amount of efficiency with speed, power and durability. It has a heavy-duty fully enclosed high-starting-torque, single and three-phase ball-bearing motor. The hoist is built with lubri-seal ball bearings; the gears and pinions are made of special heat-treated alloy steel, sealed and running in oil; and the hooks are drop-forged and heat-treated alloy steel, designed to stand 200 per cent overload.

The Quik-Lift, which may be obtained

with either load hook or trolley suspension, in capacities from 250 to 400 pounds, can be plugged into any circuit or current connection, either ac or dc, and uses only a few cents' worth of current a day. Complete information is contained in an illustrated catalog, Form E-1, which the manufacturer will send to those interested on request.

### Concrete Vibrators

The Viber line of high-speed internal concrete vibrators, available in both rigid and flexible, electric or pneumatic models for various types of concrete construction, is described in an illustrated catalog issued by the Viber Co., Los Angeles, Calif. General specifications pertaining to all models, recommendations as to the vibrator best suited for the job, and prices are given.

### Motor Patrol Grader Of Wide Application

The Galion heavy-duty motor patrol, made by the Galion Iron Works & Mfg. Co., Galion, Ohio, has a range of blade adjustments permitting it to perform operations in construction work which heretofore only a pull grader could perform. Providing a range of service from ordinary grading to bank trimming, this machine has a one piece narrow frame and no projecting parts to obstruct the operator's view. A full reversible blade permits adjustment to every angle, for flat bottom ditching, for trimming shoulder, for bank cutting, and for working in reverse gear. Power is furnished by a 66-hp 4-cylinder diesel engine which is mounted over the rear axle. According to the manufacturer, this motor patrol is a heavy-duty machine in every sense of the word as all parts are built to a strength in excess of needed requirements and it is equipped with a powerful double-drive assembly with flexible operation for rough travel without loss of traction.

Detailed information and complete specifications are contained in Bulletin 237, copies of which may be secured by those interested direct from Galion.

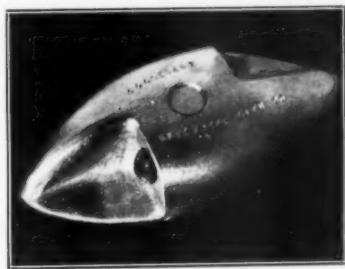
### Reflecting Markers For Center Stripes

A center-line highway marker made of aluminum alloy, into which reflector buttons are fastened, has been placed in successful service by the Reflector Lite & Equipment Mfg. Co., Harlingen, Texas.

The markers are installed along the center line of the highway and afford a long-range vision to the driver at night as well as during the day. These guides definitely keep drivers on their own side of the highway, thus eliminating the one single factor which causes the greatest number of fatalities. The streamlined shape of these center-line markers prevents damage to the tires which may strike them and the shape of the notches in which the reflector buttons are installed make them self-cleaning, accord-

ing to tests on highways. The markers are installed by a single bolt, as shown, through the center of the aluminum alloy casting.

One installation of these on State Highway No. 4, Cameron County, Texas, was made because the road was considered the most dangerous of all Rio Grande Valley highways. A number of deaths and injuries occurred prior to the installation of these markers on July 21, 1938, and since that time there has not been a single accident on the stretch so marked.



A Reflector Lite Highway Marker

## POINT FOR POINT BALANCED CRUSHERS COST LESS!

### LESS FIRST COST

Frequently takes the place of 2 or 3 crushers, rolls, screens, elevators, conveyors, bins and gates.

### LESS JAW REPLACEMENT COST

Only KUE-KEN crushes without abrasion or rubbing.

### LESS POWER COST

No heavy, unbalanced parts to lift. 95% of power is used to crush rock.

### LESS INSTALLATION COST

Perfect balance eliminates need for massive foundations—may be set on tall bins, trucks, etc.

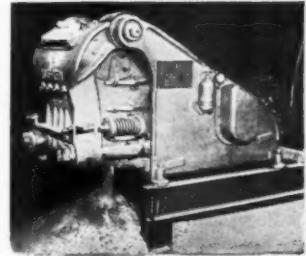
### LESS UPKEEP

More bearing surface, less pressure per square inch than any other crusher—plus cool, sealed and filtered oil bath lubrication.

### LESS FREIGHT CHARGES

Far less weight than any other crusher of equal output.

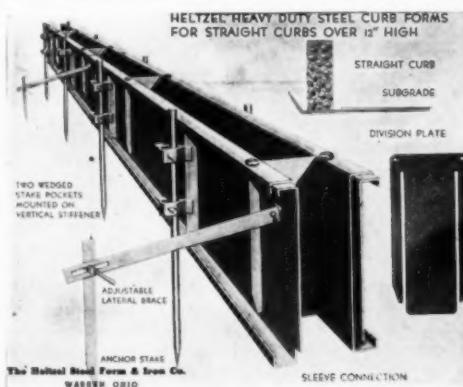
## KUE-KEN COST LESS!



The crusher shown under full load is fully described in Bulletin 600. Describes the new KUE-KEN crushing principle and tells how to obtain convincing proof that KUE-KEN crushers crush faster and finer at less cost than ever before.

## STRAUB MFG. CO.

532 CHESTNUT ST., OAKLAND, CALIF.



**Heltzel heavy duty steel forms for straight curbs. Vertical stiffeners and lateral braces insure positive rigidity. Catalog S-20**

**HELTZEL STEEL FORM & IRON CO.**  
WARREN, OHIO, U.S.A.

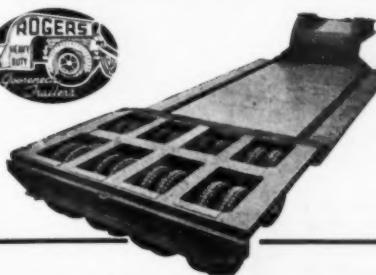
## there's ASSURANCE and SATISFACTION

### IN KNOWING IT'S A

The building of serviceable trailers to perform satisfactorily under loads of great tonnage requires engineering knowledge that can be gained only by long and close contact with the peculiar problems involved.

The name ROGERS on your trailer will assure getting the utmost in experience, performance and value, based on over 25 years of specialization.

ROGERS BROTHERS CORPORATION, 108 Orchard St., Albion, Pa.



EXPERIENCE built it—PERFORMANCE sold it

## Base Maps Produced By Planning Survey

(Continued from page 6)

for Minnesota; one load of alligators; one of deer from Old Mexico for Texas game preserves; one of lions and one of convicts.

### Road Inventory

A complete inventory of the rural roads of the state was made by automobiles equipped with compasses and odometers. The alignment of state highways was checked against the survey notes of the projects which have been constructed. The data in this section of the study included the type and width of the pavement, the width of the right-of-way, the length and type of all bridges over 20-foot span, and the spotting of every house, church, school, cemetery, airport, cotton gin, place of business, and other "culture," that is everything built by man and served by the highway. The location of railroads was placed on the maps from alignment plats furnished by the various railroads which cooperated to the fullest extent in all the work where their assistance was sought.

Every mile of the state highway system was studied for critical features such as restricted sight distances, excessive grades and curvature. These were all recorded in the field, coded and punched on IBM cards for careful analytical study. A special rural grade-crossing study was made, including a record of the number of vehicles passing each such crossing, the train traffic, sight distance and angle of approach, the grade of approach, the nature of obstructions, and accident records. The Association of American Railroads cooperated in this work and the individual railroads furnished much of the information regarding accidents at crossings and other pertinent data. Eventually this rural grade crossing study will be extended to cover city grade crossings as well.

### County and State Base Maps

The material gathered in the road inventory has been used to build draft maps on a scale of one inch to the mile for each county, supplemented by topographical features taken from the Department of the Interior's Geological Survey maps. The sale of prints of these county base maps has already become a measurable source of revenue to the Survey, causing a speeding up of the program to make the entire series of 254 maps available.

A state base map is being prepared now on a scale of one inch to 8 miles. This will not show culture but will show topography, railroads, towns and state highways. Great care is being taken in the work on this map which is being built in polyconic sections according to the convergence of the meridians. This new state map will meet the long-felt need for one based upon accurate data, and will be used as the State Highway

Department's official map. There were very few authentic county maps available prior to the survey. The Planning Survey maps are the first complete road maps of all the counties ever produced.

Advance sheets of the county maps were used by the Traffic Department to locate stations for counting traffic and the finished maps have been used for producing county traffic flow maps. They will also be used to advantage as the source of information for the selection of a future secondary Federal-Aid system.

General highway and transportation maps are being produced to show the types of pavement by symbols and the marking of the routes. Other maps will be produced from the data available as the work of the Survey, or the public, demands.

### Financial Survey

The Financial Survey includes a detailed study of the financial structure of every unit of government within the state, starting with the state itself and going through county, city, town, school district, irrigation district, sanitary district or any other government unit that has the authority to levy and collect taxes of any kind. The object of this study is to analyze the sources of funds used on the several highway systems of the state and to determine the relationship of highway financing to the entire fiscal picture for all governmental units incorporated and unincorporated, in the state.

### Road Use Study

As a part of the Financial Survey a Road Use Study was carried on, based on a method used successfully in Oregon and Washington. This study will tell who uses which roads and what for and how much. The English classes in all high schools throughout the state were furnished with a questionnaire for each pupil and one hour of instruction was given as a part of the regular class work on the proper method of answering all the questions. The instruction was given by carefully selected members of the Planning Survey field staff. The pupils were asked to sit down with the family and answer the various questions as fully as possible, showing the total miles traveled by the family in their automobile in one year, the amount of gasoline used, and other data that will be of great value in the future of road construction and location. The report is divided into three sections or classes of travel: Business, Social, and Recreation. The report is further divided into the mileage traveled on city streets, state highways and country roads, and such information as where the car is garaged, etc.

Each pupil received a questionnaire, but if there were two children in one family and two cars in the family each covered the information on one car. But if there was only one car under these conditions, one of the pupils was asked to report on the car of some other family who may have had no child or two cars and only one child. In this manner there was a very complete sampling of

the road use by the cars of the various families represented throughout the state.

### Road-Life Study

The road life study covered construc-

tion and retirement mileages and the construction investment on the 21,768-mile state system. The construction and retirement study will permit the determination of the average service lives

(Concluded on following page)

## A COMPLETE LINE OF TRAILERS



### For All Heavy Duty Hauling Jobs!

JAHN "Super-Built" trailers are built in a complete range of sizes—trailer for every heavy hauling requirement, with specialized trailer engineering behind every one. Jahn builds only heavy duty trailers. That's why Jahn trailers give many more years of service . . . why Jahn trailer goosenecks don't sag out of shape . . . why Jahn axles stand up under tough conditions.

JAHN trailer designs include complete combinations of wheel arrangements for every type of load, conforming to practically all state regulations. Advanced engineering features offered in the JAHN

trailer line include: extra-strength gooseneck, front dolly, and axle construction, deep wide flange main beams; ample cross members and gusset plates; internal expanding brakes, and the latest development in positive brake equalization.

The 6-wheel, 20-ton model shown above, as well as all other gooseneck type full trailers, can be converted into semi-trailers without any mechanical changes, by simply removing the front dolly assembly. King pin furnished fits any standard semi-automatic fifth wheel.

It will pay you to look at JAHN trailers before you buy any trailer. Write for details.

**C. R. JAHN CO. 1347 W. 37th Place, Chicago, Ill.  
"COME TO TRAILER HEADQUARTERS"**

## HERCULES GIVES YOU ALL THESE EXTRAS

- 1. Center-Lift, Super-Power Hydraulic Hoist.
- 2. "Tire-Tool" Pack Dump Bodies—a spacious weather and theft-proof compartment built-in under body.
- 3. "Eze-Reach" Tail Gate Control Lever—mounted on hoist frame within easy reach at all times.
- 4. "Button-Ease" control, on dash, operates Power Take-Off.
- 5. "Button-Ease" control, on floor, operates Hydraulic Hoist—out of the way but handy.

Invest in the "Years Ahead"—  
HERCULES Dump Bodies and Hoists



**HERCULES STEEL PRODUCTS CO.  
GALION, OHIO**

## ASPHALT PLANTS



**HOT & COLD MIX—ANY CAPACITY  
PORTABLE OR STATIONARY  
STEAM — ELECTRIC OR DIESEL**

**THE SIMPLICITY  
SYSTEM COMPANY**

CHATTANOOGA, TENNESSEE



### Change of Address

(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York, today)

From \_\_\_\_\_  
(Old address)

To \_\_\_\_\_  
(New address)

Name \_\_\_\_\_

## Valuable Road Data Secured in Survey

(Continued from preceding page)

of the various surface types that have been constructed, and will indicate the construction and reconstruction necessary for the future development of the system. The investment study will determine the total construction costs to date and, through an investigation of salvage values on those sections of roads which have been retired, the construction investment in the present existing system.

### Organization and Costs

The total personnel of the Texas Highway Planning Survey has been reasonably constant at about 175 with a large part of the staff in the field during the early work when the gathering of traffic and other data was at its height, but later most of the parties were in the offices aiding in the tabulation of the information and the production of the various maps and reports.

Office space was rented at 304 East Fifth Street, Austin, where 8,000 square feet is used for the main administrative, coding, tabulating and accounting offices. Additional space is occupied at the State Highway Building for ink drafting and at the Camp Mabry maintenance shops for miscellaneous work and overflow.

The Texas Highway Planning Survey had spent \$1,075,000 from June 1936 to March 1939 and still had available \$300,000 under the agreement between the Department of Agriculture and the state on the same basis as Federal Aid. The 1939 monies from the Federal government are not under agreement as yet but a program for their use has been formulated. They amount to about \$297,000. To complete the initial program of the Survey will require at least until the end of the 1939 calendar year.

### Personnel

F. Thayer Stoddard is Bureau Manager for the Texas Highway Planning Survey, and G. G. Edwards is State Manager for the Texas Highway Department, with D. K. Shepard, Traffic Manager; B. B. Freeborough, Inventory Manager; J. T. Bartow, Financial Manager; and R. C. Faltinson, Road Life Manager.

### It's a SPEEDLINE



### Latest Type Speed Mixers!

Fastest, easiest handling, lightest yet huskiest mixers Jaeger has ever built—end discharge trailer type (2 or 4-wheel mountings interchangeable), need 50% less street room. **Machined Steel Drum Tracks**—many improvements. Low prices. Get Catalog.

THE JAEGER MACHINE CO.  
701 Dublin Avenue, Columbus, Ohio

**JAEGER**

### New Snow Plow Unit And Auto Wrecker

The Triborough Bridge Authority of New York has recently purchased a combination snow-removal unit and wrecker for use on the new Whitestone Bridge, one of the new approaches to the New York World's Fair. This unit, built by Walter Motor Truck Co., Ridgewood, L.I., N.Y., will be used for snow removal and as a wrecker truck. A double-drum winch having a capacity of 14,000 pounds on each cable, or a total lifting capacity of 14 tons, operates the wrecker unit. The Walter four point positive drive of 125 hp has the power and traction to haul the heaviest crippled vehicles under all expected operating conditions.

Tests made during the past winter demonstrated the value of the center scraper blade for the removal of packed snow and ice to prevent the formation of dangerous ice ruts. The forward blade will be used to clear the less hard-



The New Wrecker and Snow Removal Unit Purchased by Triborough Bridge Authority of New York for Service on the Whitestone Bridge

packed snow. With dense traffic movement at all times of the year over the Whitestone Bridge, the need for prompt and complete removal of snow is of greatest importance.

Remember that proper lubrication contributes to profits by preventing breakdowns and maintaining efficient operation of equipment on the job.



### "Maw's a goin' ter wash tha gum outa hit!"

MAW, let us give you a tip right now. Save your soap and water and elbow grease. Once gum has done its dirty work in an engine, it takes more than soap and water to get it out.

The only practical way to keep an engine free from gum is to keep it out of the gasoline that goes into the engine. Even though you can't see gum in gasoline, you can check the specifications on gum content when you buy gasoline. The tentative specification of the Ameri-

can Society for Testing Materials (D439-37T)\* limits gum content to a maximum of seven milligrams of gum per 100 cubic centimeters of gasoline, just about four small drops per gallon.

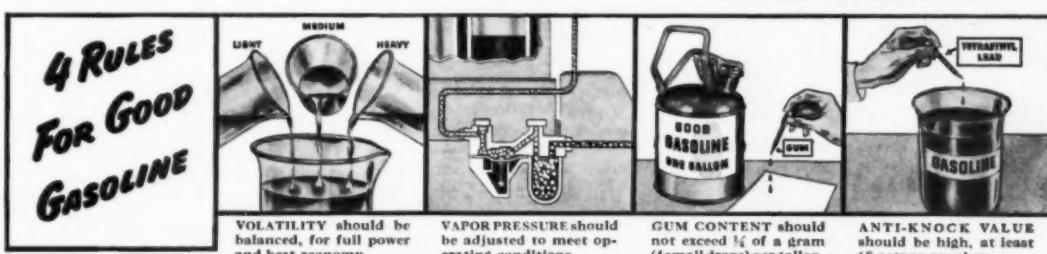
When you buy better grades of gasoline from a reputable oil refiner or marketer, you'll find other advantages besides low gum content—high anti-knock value, balanced volatility and the correct vapor pressure to prevent vapor lock.

If you have any questions on bus and

truck fuels and their characteristics, write the Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y., manufacturers of anti-knock fluids (containing tetraethyl lead) used by oil companies to improve gasolines.

\*As determined by ASTM test method D381.

THIS MONDAY NIGHT . . . Tune in "Tune-Up Time" featuring Walter O'Keefe . . . Andre Kostelanetz Orchestra . . . Kay Thompson Rhythm Singers . . . Columbia Broadcasting System, 7 P.M., E.S.T.; 6 P.M., C.S.T.; 9 P.M., M.S.T.; 8 P.M., P.S.T.



THE BETTER THE GASOLINE THE BETTER THE PERFORMANCE

## Airport Runways

(Continued from page 21)

diluted Bitumuls per 8-hour day on this job, applying 7 gallons of the liquid per  $3\frac{1}{4}$  cubic feet of windrow, which was  $4\frac{1}{2}$  per cent by weight of undiluted asphalt.

About an hour after the windrow had been mixed, the windrows were broken down and spread by an Adams diesel tandem-drive power grader supplemented by an Austin No. 10 pulled grader with a Caterpillar D8. After the material had been spread to sufficient depth and was in the proper condition for rolling, a fleet of sheepfoot rollers started working on it. These consisted of a pair of Southwest Welding Co. rollers pulled by a D6, a single roller pulled by a D4, and a D7 with three rollers. This rolling was continued until the teeth of the rollers failed to make an indentation greater than  $\frac{1}{4}$  inch. This completed the compacting operation and the base was then bladed to grade, the loose material remaining on the surface, referred to locally as "fluff" and usually amounting to about  $1\frac{1}{2}$  inches of loosely mixed material, was pulled over onto the subgrade and mixed with the next windrow of road-mixed material.

### Impromptu Tests

Two field tests of the material resulting from the road mix are of interest although probably lacking in all the scientific checks and balances. The road-mixed material has a weight of 126 pounds per cubic foot, showing that it is a dense material. Some of this material was broken out in digging a drainage pipe trench and a piece was taken to an engineer's office and immersed in water for several weeks. When it was finally removed, dried roughly with some paper towels and broken by hand, the water had penetrated for less than  $\frac{1}{4}$  inch into the mass.

The other test was made right on the field and without any choice of the location. There was a bit of discussion regarding the non-skid qualities of the rather fine-grained surface. An automobile was quickly speeded up to 50 mph, the brakes were set tight and the wheels locked. The car moved scarcely 30 feet and the rear wheels moved about 6 inches sideways. An examination of the surface over which the locked wheels



C. & E. M. Photo

An Adams Diesel Tandem Grader Spreading the Mixed Windrows at the Los Angeles Municipal Airport

had moved showed one spot about the size of one's hand where the surface was loose for a depth of less than  $\frac{1}{4}$  inch and there the slight side movement had started. The material was firm beneath the slightly abraded surface. This was a definite proof of the value of the "sand-paper" surface as an excellent non-skid material for rubber-tired vehicles.

These tests were made on the base course where it had been completed for about three months. The final surface will consist of a road-mixed material of 100 pounds of selected material similar to the base material, and 100 pounds of stone of  $\frac{3}{4}$ -inch maximum screen size with about 5 per cent retained on a  $1\frac{1}{4}$ -inch mesh. This will be mixed with 5 per cent of the same asphalt emulsion by weight.

The final runway will be  $4\frac{1}{2}$  inches of base course, with a 2-inch surface and will have a crown of 10 inches in 150 feet transversely.

### Drainage

The field has a natural drainage of 10 feet fall per mile. This is being augmented by shallow gutters on either side of the runway about 100 feet wide and with a drop of 7 inches in 50 feet, draining to the east side of the field to 18-inch concrete pipes. The final drain carrying all the surface drainage is a 48-inch concrete arch culvert running about 4,000 feet to a stream.

### Service of the Field

The City of Los Angeles is developing this field as it is believed that it can serve the metropolitan area better than

metropolitan area.

Colonel R. B. Barnitz is Airport Manager for the City of Los Angeles and all construction is under the direction of Lloyd Aldrich, City Engineer.

### National Safety Congress Meets October 16-20, 1939

The world's biggest annual safety event, the National Safety Congress and Exposition, will be held in Atlantic City, N. J., October 16-20, 1939. The Safety Congress annually brings together approximately 10,000 safety leaders from all parts of the world. This year there will be 130 sessions and 600 speakers, touching on every phase of safety, including construction in the civil engineering field.

If you have any special lubrication problems, write the Editor. He will be glad to help you.

## IT'S NEW!



Equipped as a concrete vibrator.

### THE *Mall* JACK-OF-ALL-TRADES GAS ENGINE UNIT

For years you have been waiting for this LOW PRICED, labor saving, profit making tool that has practically no limit to its adaptability. It is an all-round, big capacity tool for CONCRETE VIBRATING, CONCRETE SURFACING, SAWING, SANDING, WIRE BRUSHING and PUMPING; also, for DRILLING in brick, concrete, wood, iron or steel.

Detailed illustrated bulletin gladly sent on request—no cost or obligation!

**MALL TOOL COMPANY**  
7743 South Chicago Avenue  
Chicago, Illinois  
OFFICES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES



### SILVER KING HIGHWAY MOWER

When this efficient mower comes down the road it leaves a smooth, even path in its track. No re-cutting. The first time over lasts longer because of the close cutting job it does. If you're responsible for purchasing highway mower equipment, by all means send for the free folder illustrated below. You owe it to yourself to see what a truly great mower the Silver King is.



**THE FATE-ROOT-HEATH COMPANY**  
PLYMOUTH, OHIO

Send for this FREE FOLDER!



## P&H BACK FILLERS



### Speed Up Completion of Pipe Laying Jobs!

This P&H Back Filler will really save you time and money on those trenching jobs. Its easy adaptability to other types of handling jobs makes it one of the most practical low-cost units ever built. It's as mobile as a tractor, too—providing three forward travel speeds, ranging from 1.3 m.p.h. to 5.2 m.p.h.

These all-purpose P&H machines are available for rent or sale, both new and used at attractive prices. It will pay you to write for full information on how easy it is to own or rent a P&H Back Filler. Send today for all the details. The Harnischfeger Corporation, 4419 W. National Avenue, Milwaukee, Wisconsin.

**HARNISCHFEGER**  
CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS



HOISTS • WELDING ELECTRODES • MOTORS

## A New County Bridge In City of Cleveland

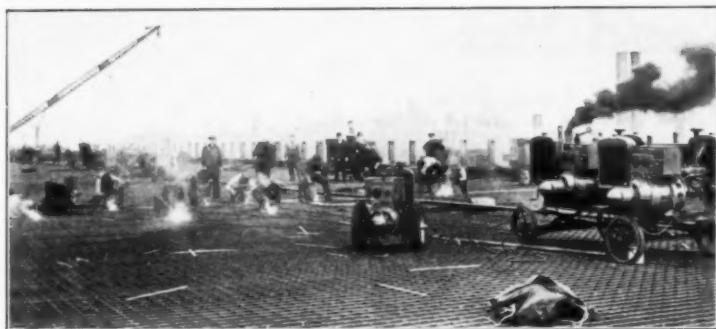
Construction of 7,400-Foot Steel Span  
To Relieve Traffic Congestion Makes  
Extensive Use of Arc Welding

♦ A NEW \$7,000,000 six-lane bridge on Main Avenue, Cleveland, Ohio, built over the Cuyahoga River to relieve traffic congestion in and out of the west side of the city, will be open June 30, according to a statement by John O. McWilliams, Engineer of Cuyahoga County. This new bridge, which will connect the recently opened Lakewood Drive with the main west-side traffic artery and thus make it possible to avoid the congested downtown area in driving through the city, is 7,400 feet in length, including approaches, 82 feet wide overall, has two sidewalks 5 feet wide, a center dividing curb, and will carry only vehicular traffic.

### Welding Used Extensively

The structure represents the largest use of the arc welding process in bridge construction ever applied to any Cuyahoga County project. The bridge involves over 60 miles of arc-welded seams, including both shop fabrication and field connections. Two 120-foot spans, which are in reality two bridges, one for the north and one for the south ramp, tying the bridge proper to the westerly approach, are of all arc-welded construction, containing approximately 30 miles of arc-welded seams. Of the other 30 miles of welding on the bridge, 14.5 miles are in the floor grating which is laid in panels and welded together; 10 miles in the steel railings, all of which were fabricated by arc welding; 4.5 miles in the steel curbings; and one mile in the modern lighting standards. Gutter drains to carry water off the bridge are also installed by arc welding.

Work on the bridge, which is being constructed jointly by Cuyahoga County and the Public Works Administration, was started in May, 1938. The arc welding on the bridge is being done by the Great Lakes Welding & Boiler Co., and the Bass Construction Co., both of Cleveland, using Lincoln Shield-Arc welders and Fleetweld electrodes.



Arc Welders Placing the Flooring of the New Main Avenue Bridge in Cleveland  
Which Will Carry Six Lanes of West Side Traffic

## Lubricating Oils For Diesel Engines

The problem of lubricating a diesel engine has always been a difficult one, because in the ignition of the fuel appreciably higher temperatures are reached than in the gasoline engine. These high temperatures, in conjunction with the use of heavy fuels which do not burn as cleanly and completely as lighter fuels, create a problem in the maintenance of efficient operation of diesel engines under all service conditions. The Standard Oil Co. of California, 225 Bush St., San Francisco, developed RPM oil, the first compounded diesel-engine oil, which was effective in the lubrication of diesel engines equipped with babbitt bearings, but could not be used in other diesels because of its corrosiveness.

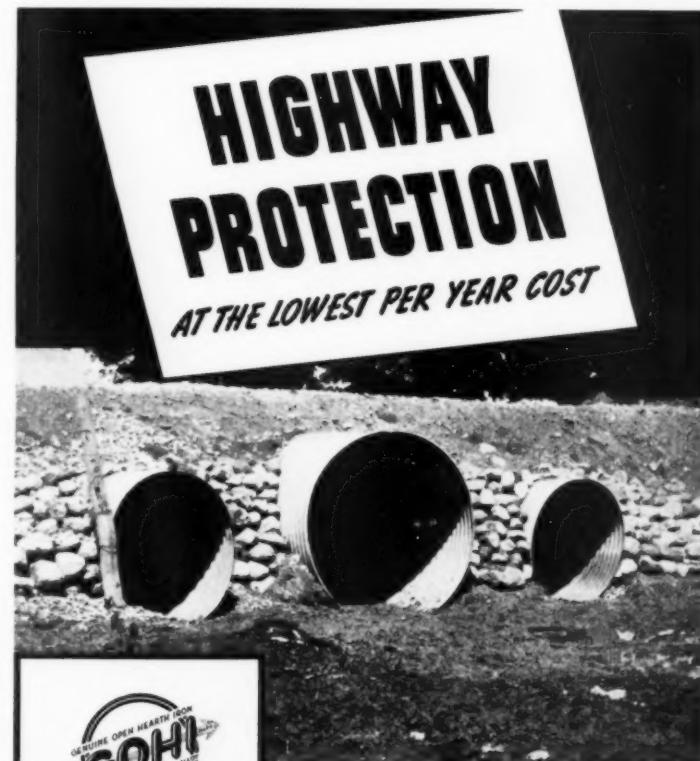
An extensive research program, including over 10,000,000 test miles and over 30,000 test hours in various types of engines, has resulted in the production of New RPM diesel-engine lubricating oil, which is a distinct improvement over the original in all important properties and is non-corrosive to all metals. It has an anti-ring sticking value superior to the original product. It is non-corrosive to alloy bearings and is therefore suitable for use in all engines; it reduces the wear on cylinders, pistons and rings; the compounding material used is a powerful anti-oxidant; and due to its stability there is less filter clogging than with other oils tested. The New RPM diesel-engine lubricating oil prevents scratching of liners and pistons under the most severe conditions, according to the manufacturer's report

on the tests. This is due to its ability to spread and to lubricate hot metal surfaces, a property which is designated as "engine film strength." Details of this oil, including analyses, may be secured direct from the Standard Oil Co. of California, at its San Francisco office or 30 Rockefeller Plaza, New York City.

## New Venezuela Highway Serves Oil Operations

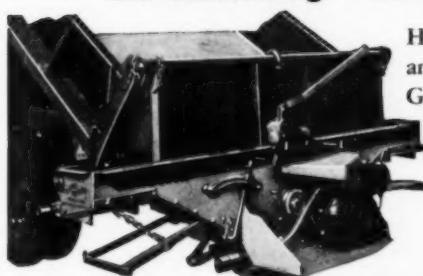
The construction of a new motor road has been started by the Ministry of Public Works of Venezuela, from Altamira, opposite Maracaibo at the entrance to the Lake of Maracaibo, to the City of Coro, the capital of the State of Zulia. At present there are only inadequate roads, scarcely usable by motor traffic, from Maracaibo to the east. The new road will traverse a district where extensive oil operations are being carried on, and will improve transportation of petroleum to the port of Coro.

This road will also furnish the first link of highway connections between the Maracaibo district and the north central district of Venezuela, including Valencia, Maracay and Caracas. The present operations will consist of grading the right-of-way and the basic construction of a road which can be used for practically any traffic during the dry season. Top surfacing is not included in the present plans.



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An informative, authoritative book on modern drainage practice is yours for the asking. 72 pages, 8 1/2" x 11", profusely illustrated. Address the fabricator nearest you.

• Built to withstand the ceaseless pounding of high-speed traffic, GOHI Corrugated Pipe gives outstanding service under modern highways at the lowest per year cost. Economical to install, and practically free from maintenance expense, GOHI Corrugated Pipe proves its superiority wherever difficult conditions are encountered. Write the fabricator nearest you for information.

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GOHI CULVERT MANUFACTURERS, INC.,  
NEWPORT, KY.

# Open Type Road-Mix In New Hampshire

Thomas W. Watkins & Son  
Completes Type That Is a  
Cross Between Arkansas Mix  
And D.B.S.T.

(Photo on page 52)

\* AS a distinctly different type of road-mix from those in the southwest, the south and in Vermont, described in these pages in the past two years, we are happy to give the details of the very successful manner in which New Hampshire is building its open-type road-mix roads. The method seems to be comparable to the Arkansas open-type aggregate work with a surface similar to the double bituminous surface treatment used in several of the southern states. A 2.2-mile project of this type was completed this past summer by Thomas W. Watkins & Son between East Barrington and Dover, N.H., on U.S. 4, using some equipment new to the northeastern section of the country.

#### Preparation

What little grading was required was chiefly on improvement in the grade of the old road, the installation of a new drainage system which included reinforced concrete pipe culverts, cast iron pipe culverts and metal pipe under-drains and some fill for the 24-foot sub-grade to carry the 12 to 24-inch gravel base to prevent the formation of frost boils in winter. The seepage gravel was dumped on the road and spread uniformly with an Allis-Chalmers tractor and bulldozer and a Galion grader. It was thoroughly wet and then rolled with a 14-ton Buffalo-Springfield 3-wheel roller to give a firm foundation for the road-mix surface. The seepage gravel was primed with 0.5 gallon per square yard of tar, Engler specific of 20 at 40 degrees C., furnished and applied by the Independent Coal Tar Co. of Boston for a width of 24 feet. The application was slightly mixed with the gravel with a wire brush drag pulled by a truck. This prime was then rolled and allowed to set or cure for a period of about one week. At this point a 1-inch penetration from the tack coat was secured.

#### Aggregate and Road Mixing

On the cured primed seepage gravel  $\frac{5}{8}$  to  $1\frac{1}{2}$ -inch stone was spread 9 feet wide and about 11 inches thick, or about 40 tons per 100 feet of 24-foot roadway, down the middle of the road with a Burch spreader box. This gave a 3-inch compacted surface course. When spread to the 24-foot width, a Galion patrol grader with a 10-foot blade was then



Mixing the Seal Coat with a Wire Drag Broom

used to spread the windrow to 20 feet wide and about  $4\frac{1}{4}$  inches thick. This 20-foot widened windrow was then shot with 0.9 gallon per square yard of RC-3 Socony cut-back asphalt of a viscosity of 600 at 50 degrees C. by Etnyre distributors owned by the Socony-Vacuum Oil Co. and mounted on Ford trucks with Warford drive.

The layer was then thoroughly mixed with a Parsons Turbo Mixer pulled by a Caterpillar diesel Forty tractor. About six passes of the machine were required for complete and thorough mixing. The Turbo Mixer consists of a series of vertical blades mounted on a heavy frame carried on pneumatic tires and with wheel controls for the depth of the mixing action of the blades, which are in five banks of four each and each group set to throw the material in the opposite direction from the set ahead. Two-foot lengths of shields or retriever blades were attached to the outside of the fourth and fifth groups of mixing blades to keep the material from spreading too far out onto the primed base during the mixing operation.

After the first mixing was completed, the material was shot again with more asphalt at the rate of 0.6 gallon per square yard and the mixing repeated. These applications of 0.9 and 0.6 gallon per square yard of 20-foot windrow are equivalent to 0.75 and 0.5 gallon per square yard of 24-foot surface. The mixed material was then spread to 24 feet wide with the Galion patrol and compacted thoroughly with several Buffalo-Springfield 14-ton 3-wheel rollers. After rolling was completed the surface was allowed to cure for two or three days to permit the cut-back liquid to evaporate from the surface and then one ton of  $\frac{1}{2}$ -inch pea stone per 100-foot station was spread by hand from trucks to fill the voids in the surface of the road-mixed material, hand-broomed and then dragged with a wire brush drag behind a truck to insure uniform spread-

ing of the pea stone and the filling of all the larger surface voids. Then the surface was shot with 0.25 gallon per square yard of Socony asphalt as a seal coat and then  $\frac{1}{4}$  to  $\frac{1}{2}$ -inch pea stone was spread with rotary spreaders developed by the New Hampshire Highway Department. At the speed they were operated the material was not spread the full width of the road, so that the machine spreading was supplemented with some hand casting along the edges. The material was spread at the rate of  $1\frac{1}{4}$  tons per 100-foot station for the 24-foot

width. A second seal or "fog" coat of the same asphalt was applied at the rate of 0.1 gallon per square yard and then the surface dragged with a wire broom to mix and coat the application of the pea stone and the two shots of asphalt. After the pea stone was thoroughly coated the surface was rolled for two or three days with the 14-ton roller, followed by a final roll by the State's 14-ton Austin-Western Roll-A-Plane, completing the



C. & E. M. Photo  
Surface Texture of Completed Road

surface which had a uniform rough surface texture with inherent non-skid qualities.

#### Personnel

The contract for the regrading and  
(Concluded on page 47)

## Save 25% to 40% of Your Labor Costs on Equipment Maintenance

Contractors and Highway Departments report savings of 25% to 40% in labor costs for maintenance of tractors, hoisting engines, rollers, trucks, graders, blades, etc. by steam cleaning with Hypersure JENNY before repair, overhauling, or repainting. Hypersure JENNY'S thorough cleaning permits closer inspection, and better and quicker repair and repaint jobs; helps keep your equipment on the job; and saves 25% to 40% of your labor cost. Find out what a real money-saver Hypersure JENNY can be for you. No obligation. Just mail the coupon for free survey.



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Tell us how, and how much JENNY can save us.

We have \_\_\_\_\_ men employed on equipment maintenance.

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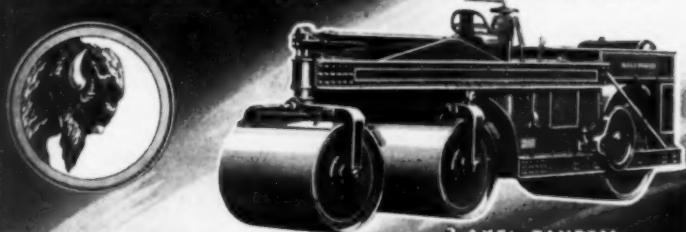
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Name \_\_\_\_\_  
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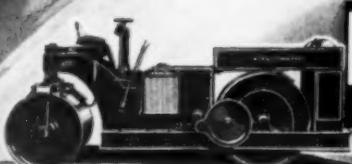


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3 AXLE TANDEM



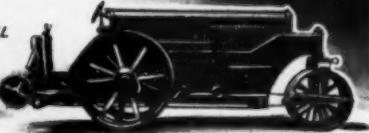
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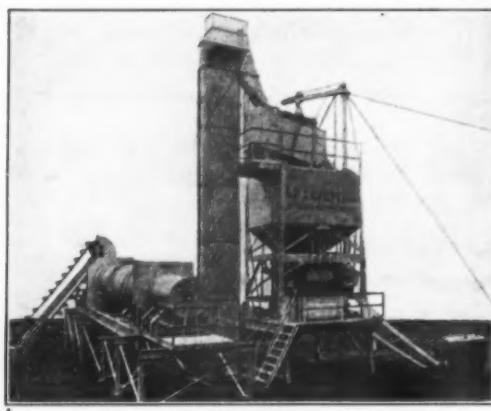
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**Buffalo-Springfield  
ROLLERS**

3 WHEEL MODELS  
From 5 to 14 tons



**The Buffalo-Springfield Roller Co.**  
Springfield, Ohio, U.S.A.



Manufactured by  
**HETHERINGTON & BERNER Inc.**  
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**PORTABILITY  
and  
CAPACITY  
COMBINED  
IN THE NEW  
MODEL P-A  
PORTABLE  
MIXING PLANT**

Write for  
Particulars  
Bulletin T-260

## Care of Rock Drills For Better Footage

The rock drill "doctor" is primarily interested in low maintenance costs and maximum footage in pneumatic-drilling operations. Wear will affect these objectives. Wear will furthermore add to the headaches of the maintenance man where it will demand more rigid inspection and will involve time lost through drill inactivity, as well as require an explanation as to the reason why.

Wear can be most effectively counteracted by lubrication. Rock-drill lubrication is distinctive, in that the lubricant is exposed almost simultaneously to wide temperature differences, the temperature of the compressed air as it enters the valve mechanism often being considerably above 150 degrees Fahrenheit, and subsequently the temperature of expansion which may approach the freezing point. The former may thin down the lubricant to the point of complete fluidity, the latter in turn may even cause congealment. Selection of a lubricant to withstand these conditions is therefore a problem which is both unique and frequently perplexing.

There are six places to look for trouble in a rock drill: the valve mechanism which controls the air and provides for its passage through the drill; the piston upon which the expanding air reacts to develop the necessary reciprocating motion; the rifle bar or independent motor, which brings about the rotation of the chuck; the chuck, which holds the drill steel; the strainer which, if installed, may keep abrasives and dirt from entering the drill, but which may also reduce drill efficiency if clogged with an excess of non-abrasive foreign matter; and the drill steel, which does the actual work of drilling.

The indications of trouble in a drill are: excessive consumption of lubricants; loose piston fit, due to wear of bushings; hung or scored pistons; pistons not striking with sufficient rapidity; drill not rotating; plugged drill steel or water tube; missing or uneven operation; dry exhaust; fogging; insufficient air pressure; plugged screen; stuck operating parts; and bad shanks or worn chucks. The majority of these troubles can often be eliminated, or at least minimized, if certain conventional precautions are observed in the handling and operation of drills.

For example, never attempt to "drive"

drill steel after it has become so dull as to cut with difficulty, as this will cause undue strain on the working parts, crystallization and fatigue of the metal and ultimate breakage which may extend back into the drill itself. Never attempt to repair drills on the job; always take them to the shop. Never leave drills on the job as long as they will run. At intervals of about once a month they should be taken down in the shop, inspected, cleaned, lubricated and reassembled. Never install new parts in conjunction with badly worn parts; neither can function effectively. Never replace the piston during overhaul until the striking end has been ground square. Be sure all drill steel shanks are also ground to insure a true end surface. Always be sure however to maintain the necessary shank length. Never use too heavy a grease in a stoker or jack hammer. It may clog the mechanisms and interfere with free operation.

Always blow and flush air and water hose before attaching. This is very important when moving the drill, to prevent entry of abrasives. Always clean and lubricate all parts thoroughly before assembly and after overhaul. Always be sure that the rubber gasket at the head of the water tube is in good condition and that it does not leak. Always investigate all packing to be sure it is in good condition. Always keep oil and grease clean and free from contamination. Always keep plug oilers well filled. This will assure evidence of lubricant on the drill steel shank. In this respect, line oilers will not always lubricate the forward end parts adequately; it will depend on whether the tool was originally designed for line or plug lubrication.

We are indebted to The Texas Co., 135 E. 42nd St., New York City, for this material taken from "Rock Drills, How to Keep Them Functioning Properly."

### Engineering Manager Made Vice-President

Marvin W. Smith, Manager of Engineering of the Westinghouse Electric & Mfg. Co., has been elected a Vice President of the company and will direct all of the company's engineering activities. Mr. Smith has been associated with Westinghouse since he left college in 1915, having had experience in many departments.

## Sections of Old Pipe Serve to Catch Asphalt

A fat spot or line across a penetration macadam road where the end of one tankload of asphalt was applied and another started makes a bad looking and a bad riding job. Contractors and engineers have devised numerous methods of overcoming this fault by the use of sand on the road to catch the first flush of asphalt from the distributor, by laying a strip of paper with sand on it across the road to catch the drippings and then rolling up the paper and throwing it to the side or burning it, and numerous trays have been noted.

On a job in northwestern Connecticut, the contractor used a new scheme which has several advantages. Sections of old corrugated culvert pipe about 15 inches wide and 12 feet long were equipped with heavy handles made of iron rods. Two of these across the road made a very good tray to catch the first flow of asphalt. As soon as the flusher



C. & E. M. Photo  
A Novel Device to Keep "Fat Spots" from Forming on the Road

pulled away, two men picked up the troughs by the handles, carried them to the side of the road and emptied the hot asphalt into the ditch immediately. By doing this the troughs did not continually increase in weight and by placing them properly fat spots were completely eliminated at the end and start of distributor runs. This produces a more uniform surface on the road.

# 100,000 LBS. OF POWER At less than \$2.00 per ton!

**MODEL GA-11 HEAVI-LIFT**  
... latest addition to the big family of  
**Blackhawk Hydraulic Jacks**  
New! Weighs only 120 lbs.—yet lifts 50-  
ton load easily and safely to total height of  
16 1/4". Has 11" collapsed height. (Can be  
equipped with gauge).  
**\$97.50** Net to user... Slightly higher  
on West Coast and in Canada.



THIS latest Blackhawk Hydraulic Jack development gives construction new lifting brawn — 50 tons of giant hydraulic power in a rugged unit weighing only 120 pounds — 11 inches in height. Like all Blackhawk Hydraulic Jacks, this new model provides tremendous power with smooth, easy strokes—always under finger-tip, precision control.

One man can operate it at capacity — because all Blackhawk Hydraulics provide 94% efficiency as against the 12% to 30% efficiency of average mechanical jacks. You get real SAFETY — there can be no sudden dropping of a load as happens when a "mechanical" shears a tooth. What's more, here's a brute for strength that is compact, easy to position — yet compares most favorably in price with big, unwieldy, mechanical jacks.



**BLACKHAWK**  
Hydraulics Lift  
These Weights:  
Hand Jacks — 1 to  
75 tons.  
Gauge Equipped  
Jacks — 7 to 75 tons.  
Inverted Jacks —  
7 to 50 tons.  
Remotely Controlled  
Jacks — 10, 20  
and 50 tons.

**MULTIPLY MAN POWER**  
Blackhawk offers a complete line of heavy-duty, gauge-equipped, and remotely controlled hydraulic jacks — 1 to 75 tons capacity. Write for data on Blackhawk Hydraulic Jacks as applied in general and special construction and engineering work.  
**A Product of BLACKHAWK MFG. CO.**  
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# BLACKHAWK

WORLD'S LARGEST MANUFACTURER OF HYDRAULIC JACKS

## NOVO

### Hoists

#### Builders and Dragline

The most complete and up-to-date line of Hoists up to 60 H. P. on the market.

Here are the reasons—

**Smooth Action**—double cone friction blocks give a double friction area.

**Easy Control**—with the Novo screw thrust.

**Self-energizing Brakes**—The drop of the load helps set the brakes.

**Silent Chain Drive**—on all Hoists above 30 H. P.

**Super strength** built into all Hoists by the use of a high steel content nickel alloy in frames, drums, gears and shafts.



**NOVO ENGINE CO.**  
216 PORTER STREET  
LANSING • MICHIGAN

# Special Machines On Arizona Roads

## Necessity of Economical Maintenance of Highways Led to Careful Planning For Storage and Machines

By HARRY DUBERSTEIN, Arizona State Highway Department

ALTHOUGH only a short time ago the majority of the highways in Arizona were gravel surfaced, today 80 per cent of the state highway system is paved with asphaltic oil mix while the remaining 20 per cent is paved with concrete or gravel surfaced. This program of improvement has necessitated a change in setup for maintenance and now the bases of operation are located at points where men, equipment, materials and supplies can be handled to the best advantage.

### Primary Problems

Patching oil cake and sealing oiled surfaces are the primary economic problems. To attain the most efficient maintenance work, a small distributor or patching unit, suited for all-weather duty, with heating units and pressure tanks included, is required. Oil storage tanks must be located so that they will be on or near a railroad spur and also near enough to the section of highway for which the oil is intended so that little time is lost in loading the small unit at the storage tank and its transportation to the job.

### Patching Units

Five new 550-gallon patching units and over twenty smaller units from 250 to 350 gallons are in use, the latter being replaced by the new larger units as fast as they are built. This 550-gallon unit was developed in the Highway Shops at Phoenix and is built on a Detroit 3-ton 4-wheel trailer chassis carrying the 550-gallon tank, a 25-gallon kerosene fuel tank on one side and an air tank with 30 pounds of air pressure on the other side, complete with tank equipment. The trailer wheels are equipped with 750 x 20 8-ply pneumatic tires. A Ford Model A engine drives a 3-inch Roper gear pump for the asphalt through a 60 roller chain with a 10-inch sprocket on the motor and a 12-inch sprocket on the pump. Both sprockets and chain are safely guarded by a sheet metal cover. The asphalt pump has a 3-inch relief valve discharging into the tank. A 100-pound air gage on each side of the truck shows the pressure maintained in the air tank by the portable compressor.

A 6-foot spray bar at the rear has two 2-foot extensions and the spray nozzles have 3/32-inch slots. At the back also is a 3/4-inch hand spray pipe with 25 feet of oil-proof rubber hose. The asphalt tank is heated by two coil-type pressure burners consuming together about 5 quarts of kerosene per hour. One half hour of burner operation will raise the tank contents from a temperature of 30 degrees to 160 degrees. When oil is used for patching it is heated, but when emulsions are



A Typical Road-Oil Storage Tank Used By the Arizona State Highway Department

used for sealing, the material is not heated. The two smoke stacks at the front of the tank connect with the heating flues and are equipped with adjustable dampers. A 5-foot tongue with a safety chain is used for towing the patch units behind maintenance trucks.

### Storage Tanks

There is only one large 10,000-gallon storage tank with heating attachments at the present time but several more are contemplated. There are four 10,000-gallon tanks without heating attachments in use in the southern part of Arizona where the weather is such that the oil will flow freely at all times. The former is equipped with heating units, agitator blades on a shaft around the heating coils, and a small compressor for heating pressure. The heating unit is a fuel oil torch equipped with a pressure tank, and the flame is applied through suitable flues built into the large storage tank. The agitators are operated by inserting a crank into the outer socket of the shaft and turning it by hand. The 4-inch intake and outlet pipes are equipped with suitable valves. A clean-out manhole is bolted to the side of the tank at the bottom. Another manhole is located in the roof of the tank so that when the tank must be entered for cleaning and other maintenance, a good circulation of air for ventilation is possible. These tanks are set on steel towers at the proper elevation for each location.

In the upper country where winters are severe for Arizona, the storage tanks are built underground with heating units attached with pumps installed to transfer the contents to the patch units and distributors.

### Maintenance Costs

The cost of maintaining oiled roads in Arizona must not exceed \$300.00 per mile per year, including patching oiled surfaces, sealing, shoulder work and drainage upkeep. About 400 square yards of patching is done per day by each unit, the patch made ranging in size from one foot square to one 20 feet wide by 100 feet long. The kind of patch varies with conditions.

## CUMMER Asphalt Plants

All styles and sizes  
for  
HOT or COLD Mix

## Heavy-Duty Mixers

45 Years' Experience

THE F. D. CUMMER  
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Write for  
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Be sure it's the

## GIANTGRIP<sup>TM</sup> STRAIGHTEDGE

Either Steel or Aluminum

For Checking Concrete Surface

Two useable edges—one sharp-cornered and squared for scraping; the other rounded for line-point straightedging.

ASK YOUR DEALER

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(Division of Hendie Forge Co.)

10302 BEECH RD., CLEVELAND, OHIO

## Speeder Machinery Co. Merged with Link-Belt

The consolidation of the Speeder Machinery Corp., Cedar Rapids, Iowa, manufacturer of  $\frac{3}{8}$  to  $\frac{3}{4}$ -yard power-operated excavating and material-handling shovels, draglines and cranes, with the Shovel Division of the Link-Belt Co., Chicago, Ill., has been announced. For the present, each organization will operate independently, with Speeder a subsidiary of Link-Belt and T. M. Deal continuing as President.

This merger consolidates the products of two well-known manufacturers into a complete line ranging from  $\frac{3}{8}$  to  $2\frac{1}{2}$ -yard crawler-mounted shovels, draglines and cranes.

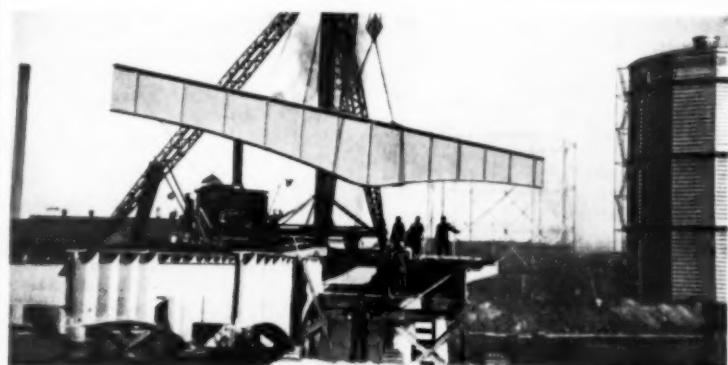
## New Dealers Appointed For Hercules Rollers

The Fletcher Equipment Co., Inc., 309 Magazine St., New Orleans, La., has

recently been appointed distributor of Hercules road rollers in Louisiana and Southern Mississippi, and The United Sales Corp., 7630 Meade St., Wilkinsburg, Pittsburgh, Pa., has been appointed distributor for the western half of Pennsylvania, according to a report received from The Hercules Co., Marion, Ohio, announcing enlargement of its distribution facilities.

Do you wish a really superior dumping unit for  
handling 2-cu. yd. Detachable Buckets?  
SEE OUR MODEL LF  
(Load Forward)

**DEMPSTER DUMPSTER**  
For any 1½-ton truck  
COUNTERWEIGHT  
NO OVERHANG  
SIDESWAY  
All the load on the chassis  
DEMPSTER BROS. INC. Knoxville, Tenn.



## AMERICAN DERRICKS

**4 to 250 Tons** Designed and Built for High Speed with Safety  
Present-day high-speed material handling calls for the absolute "Tops" in derrick design and construction. The AMERICAN Line contains Steel Derricks built to fill every requirement—Stiffleg, Guy, Steel Erectors, Self-Supporting, Tower and Barge Types. The combined experience of two great organizations of derrick specialists has gone into the design and construction of AMERICAN Steel Derricks. Let us prove to you that you pay no more for AMERICAN QUALITY.

Write Dept. E C for Catalog D-1.

**AMERICAN HOIST & DERRICK CO.**  
SAINT PAUL, MINNESOTA

**AMERICAN TERRY DERRICK COMPANY**  
SOUTH KEARNY, N. J.  
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*Right Down to Fighting Weight*

You want more than dead weight in a bucket to lick a tough digging job. You want speed—agility! Williams design, welded construction and special alloys insure stamina and ruggedness, without excessive weight. Williams Buckets carry plenty of weight, but they carry it in the right places and in the right proportions. You move more materials in less time with Williams Buckets—and that's profitable.

... and if that's what you want in a bucket, you'll find your particular type in the Williams Catalog. It's free!

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Distributors located in all parts of the country represent the Williams Line of Portable, Medium, Heavy, and Dragline Buckets.

**WILLIAMS Buckets**  
built by WELLMAN  
★ BUILT TO LAST...and MOVE DIRT FAST! ★



# Good Concrete Paving Crew Poured 110 Feet Per Hour

**Claussen-Lawrence Const. Co.  
Does Not Boast of Records  
But Sticks to Organization  
That Insures Uniform Work**

♦ THE 10-hour day and 40-hour week limitations on labor have hurt the pride of many a contractor whose ego was greatly satisfied by such remarks as "We hit 2,000 feet day before yesterday and will put in over a mile and a quarter this week." Those boasts were made in the days of daylight-to-darkness paving, six days a week. Today, conservative contractors know that anything better than 100 feet an hour, with the present labor available, on a 9.6-9-inch section for 40 hours in one week means just the right balance of labor and equipment. Claussen-Lawrence Construction Co. on its 14,640-foot contract paving State Route 10 northeast of Monroe, Ga., maintained 110 feet an hour throughout the length of the job. Its organization is interesting because it was not overloaded at any point.

#### Batching

The batching plant was set up in Monroe, requiring a dead haul of nearly 7 miles but this was overcome by the use of a few extra batch trucks. The aggregates were received by rail in gondola cars and both the sand and the crushed stone were unloaded with a P & H crane with a 40-foot boom and 1-yard Blaw-Knox clamshell at the rate of 12 to 15 cars a day. The batches were weighed out in a Johnson batching plant with the following batch weights: 1,330 pounds of sand; 2,340 pounds of crushed stone; 6½ sacks of cement. The contractor used two men cleaning the aggregate cars and spotting the bucket.

The cement platform was located about two city blocks from the batchers in the direction of the road. There five men in the car stacked the six bags of cement for each batch and made up the split bag required by the specifications. A small scales was put into the car and the required amount of cement weighed out and tied in an extra bag. When the batch trucks reached the last section before the paver five men handled the emptying of the bags, with one of them clipping the bags, two dumping, one knocking the piles down so that the second batch would not spill over onto the first, and one man baling the bags. One man handled the dumping of the batches into the skip of the Koehring 27-E paver.

#### The Subgrade and Forms

Where the subgrade was high the contractor used a Cleveland scarifier to break up the hard ground for the Adams No. 121 leaning-wheel grader pulled by a Caterpillar Sixty to rough in the subgrade. Low spots were brought to the proper height and rolled with a Buffalo-Springfield 10-ton roller. Most of the work on the form trench was done with the Adams grader. The trench was then trimmed by a group of eight men ahead of the form setter and two helpers who placed the 9-inch Blaw-Knox steel forms with 9-inch base to line and grade. Five men hand-tamped the forms for the Blaw-Knox Flynn Surgrader that followed and cut the subgrade to its true cross section.

#### Producing the Pavement

Water for the paving and curing operations was furnished by a Rex triplex pump at one end of the job and a Barnes

triplex working at the other end of the line. The pipe was 2½-inch and carried paver valves every 200 feet and 150 feet of hose on the paver. To insure a quick connection between the paver hose and the line the paver hose was equipped with a Boss connection and duplicates were placed on the various valves on the line. This saved much time and prevented the loss of batches.

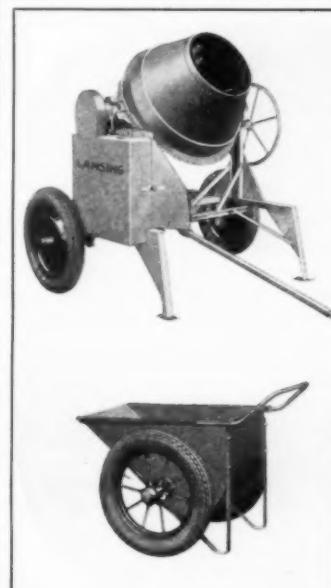
The steel for the center joint and the transverse joints as well as a wood square for setting the joint steel square with the road was carried on a pair of boxes mounted on the subgrade planer pulled by the paver. The paver pulled a Ted Carr subgrade planer and that pulled, through a pair of iron straps, a Carr scratch template. This insured an immediate check on the subgrade, and the uniformity of the pull by the machine ahead prevented the scratch template being pulled off the forms every few yards as is the case many times when it is pulled by hand. Two men shoveled out the dirt from in front of the planer and then went back and cleaned out the fillet of dirt against the forms.

The steel was set by two men who placed the Truscon center steel in 10-foot lengths and then threaded through the five 1½-inch round deformed tie bars

3 feet long in each length of the center steel. These tie bars were held up to the proper level by sheet metal feet or chairs. For both the expansion and the contraction joints the steel was a five-way assembly. This consisted of 7/8-inch round dowels 15 inches long completely encased in metal sleeves and coated with graphite grease to prevent sticking in the sleeves when the dowels are called upon to act as a sliding joint in the expansion joint. These dowels were held in position on a 1½-inch round transverse bar or tie rod 9 feet 9 inches long.

Wires across the assembly at three points held it tight for placing. These were not cut when the concrete was poured. The dowel assembly was held in position for pouring by ten metal chairs for each 10-foot section. A steel header 3/4-inch thick was placed over the center of the dowel assembly at expansion joints. The header was cut to the true cross section of the slab and oiled before placing. It was staked with heavy pins on both sides at five points to hold it when the concrete was poured.

(Concluded on page 45)



## LANSING

### CONCRETE MIXERS • BARROWS • CARTS

The new 3½ E. D. (End Dump) Trailer Mixer is light and properly balanced for high speed trailing and quick placing on the job. Capacity 3½ cu. ft. One of several of Lansing Concrete Mixers.

K-4 Lansing Concrete Barrow. Hung to dump easily. Roller bearing wheels. With or without pneumatic tires. 34" high. Weight only 225 lbs.

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DIVISION OF LA CROSSE BOILER CO.

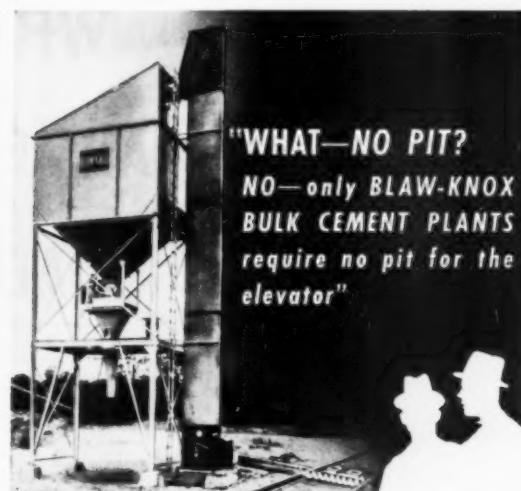
"I like this convertible idea on BLAW-KNOX TAMPING ROLLERS!"

"You can make any arrangement or combination you want"

For compacting earth fills—the practical design of Blaw-Knox Sheepfoot TAMPING ROLLERS appeals to contractors because they give uninterrupted service and meet all modern specification requirements. The roller units are full floating, on husky frames—built for long, hard use. Send for complete details and prices.

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Sheepfoot  
TAMPING ROLLERS



Blaw-Knox BULK CEMENT PLANTS are the ultimate in portability, speed, and convenience of use and operation. They are complete units for unloading, storage, batching and handling of bulk cement—dependable and accurate.

21 Completely described in Blaw-Knox Catalog No. 1566. Send for copy.

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BLAW-KNOX DIVISION  
OF BLAW-KNOX CO.  
FARMER'S BANK BLDG., PITTSBURGH, PA.

**Bulk Cement Plants**



A Trailmobile Unit for Transporting Equipment or Materials

### A Versatile Trailer For Contractors' Use

A trailer of unusual design was recently completed by Trailmobile, The Trailer Co. of America, Cincinnati, Ohio, for the Public Service Co. of Indiana, which has many features of particular interest to contractors who must haul equipment from one job to another. The illustration shows the unit as a conventional four-wheel trailer for carrying machinery, and attached to a motor truck.

A simple manual operation requiring only a few minutes changes this trailer into a semi-trailer by removing the front dolly and hooking the unit to a conventional lower fifth wheel mounted on a four-wheel tractor. In this position the semi-trailer has essentially the same use as the four-wheel trailer, but requires the use of a four-wheel tractor instead of attaching with a pintle hook to a motor truck.

The third use for this piece of equipment comes by mounting the cross bolster illustrated on the front platform of the trailer directly on the front dolly. In this position the unit becomes a pole trailer, which is attached, by the reach, directly to the pintle hook on the straight truck. Whether it be a public service company wishing to haul poles or a contractor hauling long piles, this feature has its advantages.

The versatility of this piece of equipment in carrying loads of different types and sizes avoids the necessity of keeping, maintaining and buying license plates for additional trailer units.

### Blade Maintainer Has Special Frame

The Shunk multiple-blade road maintainer has been developed for maintaining gravel, chert, sand-clay and dirt roads, and for oil mixing, mixed-in-place retread in the lighter volumes, and for road stabilization. It differs from other multiple blade maintainers in that it has a carrier frame from which the dragging member is suspended and controlled. This makes it possible to raise or lower this member from the operator's position, either entire or each full side independently, and to adjust it to conform to any existing or predetermined crown in the road surface. Thus the blades are maintained upon a level plane by the long heavy channel beams to which they are attached.

It is equipped with seven 8-inch wide blades, the forward six set at 45 degrees and the rear one adjustable to deliver the surplus to either side. This is equivalent to working the road four times in a single operation, with 40 feet of blades. The dragging member weighs approximately 2,500 pounds and is over 20 feet in length, insuring a smooth level surface.

The machine makes a cut 9 feet wide which can be increased to 10½ or 12 feet with extensions. The blade clearance is 9 inches, which is ample for

of resistance welding are not in as common use as they are in America. There is a great interest in this method of welding, however, particularly for automobile, aircraft and railway construction. Gas welding, cutting and brazing are in common use, and very high grade results are being obtained on all metals.

Charles H. Jennings, Engineer in Charge of Welding Research, Westinghouse Electric & Mfg. Co., in his paper "European Welding Practice and Ameri-

can Trends," presented before the Association of Iron and Steel Engineers, noted that the industries in which welding is being used compare with those in the United States, and include ships, buildings, and bridges in the construction field. Mr. Jennings feels that although welding is used in nearly every field of engineering today, that the future possibilities both in Europe and America indicate that its development will be even greater in the years to come.



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BUILDS IT BETTER

BINS, Portable and Stationary  
CEMENT BINS, Portable and Stationary  
CENTRAL MIXING PLANTS  
BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)  
BITUMINOUS PAVING FORMS  
ROAD FORMS (with lip curb and integral curb attachments)  
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CONCRETE BUCKETS  
SUBGRADE TESTERS  
SUBGRADE PLANERS  
TOOL BOXES  
FINISHING TOOLS FOR CONCRETE ROADS

### • Note simplified means of holding face form rigidly in place when constructing curbs against pavement. Exclusive with Heltzel steel forms.

**HELTZEL** STEEL FORM & IRON CO.  
WARREN, OHIO, U.S.A.

Range—Speed of Adjustments  
Visibility of Work . . . . .  
Ease of Control . . . . .

### On Galion No. 210 Pull Grader

Equipped with 10-foot moldboard and patented E-Z lift manual control, the new Galion No. 210 leaning wheel grader will do the lion's share of your normal grading and help you build more and better roads.

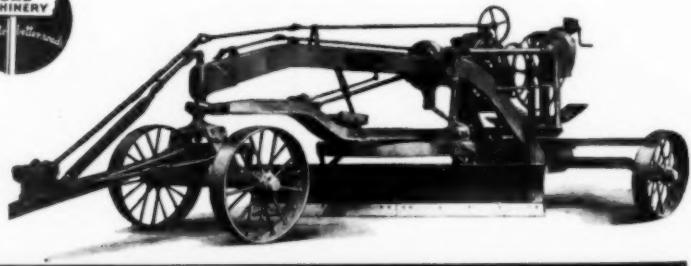


Moldboard can be shifted up to 80° for shoulder, high bank and vertical angle cuts; rigid box type frame providing full visibility of work; centralized controls; newly designed circle assembly; single mechanism for side shift and high lift . . . all contribute to the genuine utility of the No. 210 and provide for easy operation.

Let us send you Bulletin No. 234, which gives complete specifications.

### THE GALION IRON WORKS & MFG. CO.

Main Office and Works: Galion, Ohio  
Export Division: Columbus, Ohio



### WHY NOT SPECIFY ARMORSTEEL AND GET THE BEST ROADGUARD



THE ARMORSTEEL ROADGUARD INC.  
3030 EUCLID AVE. CLEVELAND, O.

## Producing Pavement For Concrete Road

(Continued from page 43)

There were four puddlers moving the concrete to place and two of them worked mostly at the strike-off of the finishing machine.

### Finishing and Curing

The concrete was finished transversely with an Ord double-screed finishing machine. On the finisher a T-iron with a pair of plow handles was carried for cutting the slots for the dummy joints at 30-foot intervals between the expansion joints which were spaced 90 feet apart. A 1½ x ¼-inch plate was inserted in the slot at once by the two men who handled the T-iron. This was followed immediately by the "Charley Horse," a 10-foot Carr longitudinal float worked from a pipe bridge. The next finishers handled the two Heltzel straight-edges which were used as drags and for checking. The same men pulled a 10-inch rubberized canvas box belt and then gave a herringbone finish to the slab with a burlap drag.

Two joint finishers were used, one on the dummy joints and the other on the expansion joints. One other man edged the slab on both sides. Two men placed the wet burlap on the finished concrete from a rolling bridge. The burlap remained on the slab over night. The following morning the curing foreman came out and with twenty men pulled the forms, removed the burlap and the head finisher straight-edged the slab to check it for any high spots and then it was ready for the long curing process. This contractor chose the better method of handling the earth cure by first wetting the pavement and then spreading the first inch of the earth, wetting that and returning and spreading the balance of the earth and wetting the whole again. The sprinkling was continued daily for a period of 10 days, with one man and a hose for every 1,000 feet of slab being cured. The forms were hauled forward to the subgrade on a trailer pulled by an Allis-Chambers Model M tractor.

As insurance against the delays and losses attendant upon working without the proper amount of light in case of late finishing, the contractor had a Kohler light plant mounted on a small two-wheel trailer which could be moved out onto the job behind any automobile and the lights strung along the road wherever needed. A duplicate plant was used at the office close to the batching plant so that there was always light there for the bookkeeper and for the mechanic when he had a repair to make with the acetylene welding outfit.

### Personnel

Claussen-Lawrence Construction Co. of Augusta, Ga., was awarded this contract on its low bid of \$104,198.00. W. R. Barnes was Superintendent for the contractor and E. L. Honeycutt was

Resident Engineer for the Georgia State Highway Board.

### State Highway Association To Celebrate 25-Year Mark

Twenty-five years ago the states caught the vision of building roads and coordinating their construction at state lines, so this year the American Association of State Highway Officials will recognize this quarter-century of highway progress at its annual convention the second week of October. The program will start with a meeting in Washington, D. C., and then continue in Richmond, Va.

W. W. Mack of Delaware, President of the Association, reports that plans are being formulated through a comprehensive committee representing not only every part of the United States, but also those who through the years have been responsible for the construction and maintenance of what has grown into a very elaborate and useful network of inter-state highways.

Mr. Mack continued: "The twenty-five-year life of this Association covers the entire period of real road construction in this country, as well as the growth and development of individual motor transportation. Since this organization is comprised of all the state highway departments and the Federal Government as represented by the Bureau of Public Roads, the celebration is planned to cover the activities of all these governmental authorities in road and bridge construction. It will be a real 'National Fair' of road building."

### Peru Pushes Highway On Pan-American Route

Peru is doing an outstanding job to complete its section of the Pan-American Highway. The distance to be covered from its border on the north at Ecuador to the south at Chile and Bolivia embraces 2,005 miles. All of this road is passable and its improvement is being carried forward at a steady rate, with some 435 miles already asphalted and plans prepared to improve the remainder in a similar manner. At Nazca, about 300 miles south of Lima, the highway branches, one road leading to the highlands and to La Paz, while the other continues near the coast to the Chilean border. It is this coastal route which is passable the entire length now that the section between Ocoña and Atico has been completed. By the end of 1940 it seems quite certain that 840 miles will be completely improved and the remainder sufficiently improved to permit comfortable travel at all periods of the year.

According to a resolution of January 18, 1939, work should commence soon on the asphalting of the 144-mile Ica-Nazca-Lomas section of the coastal route, which will form the third long paved section of the Pan-American Highway. To accomplish all of this work in the short period since activities began in earnest, the efforts of 35,000 laborers and the largest aggregation of road machinery in Peru have been used.

### New Sand Classifier Dewaterers and Rewashes

Recognizing the increasing demand for closely graded sands, the Smith Engineering Works, 4014 No. Holton St., Milwaukee, Wis., has recently developed a new sand classifier which dewaterers, rewashes and classifies sand, operating on the same principle as the Telsmith Sand Drag. Close gradation of fine and coarse sands is obtained by means of increased water capacity and a larger screw which is greater in length and has a spiral of shorter pitch set at a steeper

angle. Water overflow velocity and size of finished product are regulated by a new type of quickly adjusted control. The screw, of special abrasion-resisting steel, is mounted on a shaft, having a water-lubricated cutless rubber bearing at the lower end. All moving parts are mounted in a steel box of special shape.

Additional information on this new Telsmith sand classifier, which is available in single and double-screw types with sand capacities from 10 to 60 cubic yards of coarse sand per hour, may be obtained by writing direct to the manufacturer and mentioning this item.

## South Bend



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### MAINTENANCE UNITS For Bituminous Surfaces

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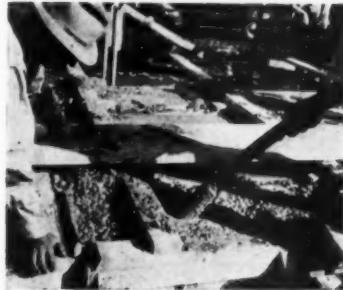
### GUTTER SNIPE Pickup Sweepers

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Buy a  
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**Powerful**  
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### OUTPERFORMS THEM ALL!

Keep your jobs running  
SMOOTHLY and ECONOMICALLY  
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*Get A MOUTHFUL AT EVERY BITE*

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For Recreation Or Relaxation Choose the Chelsea

FROM WITHIN MEALS & BATH PER DAY \$3.00 DAILY PER PERSON 7 in a Room

Here you will find everything to further your comfort and enjoyment—outside ocean-view rooms . . . sun deck . . . beautiful dining room . . . ocean's edge . . . superb cuisine . . . varied sports . . . and entertainment. You'll like your fellow guests . . . and the delightfully friendly atmosphere of The Chelsea.

SPECIAL WEEKLY RATES

RIGHT ON THE BOARDWALK

ATLANTIC CITY

JOE BRENNAN & CHRISTIAN MYERS JULIAN G. BRENNAN



A New Metal Pile Shoe

### Brooming of Piles Stopped by New Shoe

A new metal pile shoe which protects the ends of wood piles and prevents brooming, has been announced by The Union Metal Mfg. Co., Canton, Ohio. These shoes are available in two sizes to fit piles with tip diameters ranging from 5 to 14 inches. The shoes are made from heavy-gage rolled steel, formed in two sections and electrically welded.

When driving wood piling through shale, gravel, riprap rock or other hard soil, the use of these metal shoes is said not only to prevent the ends of the piles from brooming, but to make it possible to drive them further into the ground more quickly. The shoes are attached to the roughly-sharpened end of the pile by nail holes in each wing. The manufacturer states that the wings can be easily bent with a hammer to conform to small diameter tips.

### A New Crack Filler For Road Fractures

The Butler Crackfiller, recently developed by Auburn Metal Products Co., Auburn, Ind., for filling pavement cracks and expansion joints with heated bituminous materials, is made with one container inside of another with insulating material between them. This one inch of insulation gives a thermos jug effect and pouring materials are maintained at practically a constant temperature. The unit is made of pressed steel with welded joints and the lid, which is also packed with insulation, is pivoted to swing open with a spring lock to hold it in the closed position. Among the features of this crack filler, according to the manufacturer, are: the elimination of the necessity for burning out accumulated cold asphaltic material; a positive shut-off valve to stop the flow immediately and without drip; and a handy trigger arrangement in the handle to regulate the pouring valve and an adjustable stop to give any constant amount of flow desired.

Complete details are contained in an illustrated booklet, copies of which may be obtained by those interested direct from the manufacturer.

### Digging and Rehandling Buckets of All Types

The Hayward line of digging and rehandling buckets, including several sizes and types of clamshells, standard, multi-power, three-bladed and dwarf orange-peels, and dragline or drag scraper buckets, is described briefly and illustrated in condensed catalog O-266-A. The four separate types of Hayward buckets are claimed to meet the requirements for every type of grab bucket service.

Copies of this folder or separate bulletins illustrating individual types of Hayward buckets may be secured by interested contractors and engineers direct from the manufacturer.

### Stabilization Cuts Gravel Maintenance

Very interesting studies have been made under the direction of Professor R. S. Swinton of the University of Michigan to show the savings in materials and labor which can be effected through the stabilization of gravel roads. By finding the loss of surface material from ordinary gravel roads and comparing it with the loss from treated and stabilized roads, their relative economy is easily established. When the stretch of stabilized construction is sufficient to eliminate a unit of maintenance equipment, another large economy is effected.

In a paper presented before the Highway Research Board, Professor Swinton showed that for an average traffic of around 400 vehicles, using the wear on an untreated road as 100 per cent, a treated road gave 49 per cent wear and a stabilized road 36 per cent. The studies thus far do not indicate that the

losses are proportional to the amount of traffic, because as much as one-third of the apparent wear or loss of surface elevation, as measured by level rods to an accuracy of 0.01 foot, is shown to be by downward and outward plastic flow of the roadbed itself.

### High Frequency Vibrator For Concrete Construction

The Master Vibrator Co., Dayton, Ohio, has issued a catalog describing and illustrating its line of electric and gas power unit vibrators. The electric models are light and small, providing for easy portability about the job, and can be furnished for 1 or 3 phase or direct current. The gas power units, furnished with either Wisconsin or Briggs & Stratton engines, are extremely versatile in that speeds can be controlled and they can operate anywhere regardless of whether or not electric current is available.



The Model 23 Master Gas-Powered Vibrator

The various models are illustrated in this catalog and suggestions are given as to the one best suited for a specific type of job. Copies of this Form No. 116 may be secured by those interested direct from the Master Vibrator Co., or through CONTRACTORS AND ENGINEERS MONTHLY.

## Why an Etnyre?

The ETNYRE BLACKTOPPER DISTRIBUTOR is the product of a manufacturer with over forty years' experience, whose sole aim is to build better equipment.

Experience of hundreds of users has proven the dependability of Etnyre Distributors.

The ETNYRE BLACKTOPPER DISTRIBUTOR is equipped with only the essentials for rapid, economical and accurate application.

The ETNYRE BLACKTOPPER DISTRIBUTOR will heat to the required temperature and apply all grades of sprayable road material accurately at specified amounts thru any width of bar up to 24 ft. or wider with

✓ No Drips    ✓ No Skips    ✓ No Leaks    ✓ No Streaks

The ETNYRE BLACKTOPPER DISTRIBUTOR costs only a little more.

E. D. ETNYRE & CO., OREGON, ILL.

## Why NOT an Etnyre?

**SAVINGS in every  
MICHIGAN bucketful!**

More passes per hour—and per dollar! Tie-ups and loading delays are greatly reduced by fast Michigan Truck Shovels with their Fingertip Air Controls and Full Circle Loading. Saves man-hours and truck-hours. Sturdy, balanced construction enables high-speed production—minimizes repairs. Drives to the job as easily, swiftly and economically as a truck—extra savings in every mile!

MICHIGAN  
POWER SHOVEL CO.

Benton Harbor, Mich. U.S.A.

3/8 YD  
1/2 YD

Write for Bulletin C-69

The  
Dig-  
on t  
scrab  
spres



Photo by L. B. Yost, Public Relations Division, General Motors

Officials of the American Road Builders' Association and Its Various Divisions Visit the New York World's Fair On May 26 as Guests of Wm. P. McDonald, Paving Contractor and Past President of the ARBA

## Open-Type Road Mix Successful in N. H.

(Continued from page 40)

surfacing of the 2.2 miles of U. S. 4 between East Barrington and Dover, N. H., was awarded to Thomas W. Watkins & Sons of Amesbury, Mass., on its low bid of \$36,875.00. Thomas W. Watkins acted as his own Superintendent on this contract and Charles Downing was Resident Engineer for the New Hampshire Highway Department.

### Drivers, Not Design Cause Bad Accidents

When a 14-mile stretch on U. S. 30 in Indiana was opened a little more than a year ago, it was believed that it was the best and most modern highway in the country and one on which accidents would be reduced to a minimum. The road consists of two 22-foot lanes divided by 40 feet of park section, built on a 200-foot right-of-way, and on new location.

The accident experience on this dual-lane section compiled by the Indiana

Highway Commission's Traffic Department and reported by M. R. Keefe, Chief Engineer of the Commission, at the Twenty-Fifth Annual Purdue Road School, is very interesting. The dividing parkway makes it impossible for medial accidents to occur on this road, yet in 1938 on this 14-mile stretch two persons were killed and property damage of \$3,340 was reported in twenty-one accidents.

During the year 1938, there were reported a total of less than 10,000 accidents on the rural highways of the state system, making an overall average of one accident per mile. On the highway representing the highest type of construction in the state, with a light traffic load, the average is 1.5 accidents per mile. Seventeen of the accidents were on dry pavement and thirteen occurred during daylight hours.

These statistics, Mr. Keefe said, are not an argument against construction of this type of pavement, but they clearly demonstrate that the best engineering practice will not eliminate or prevent accidents. The human equation is very much in evidence, as indicated by one of the accidents which occurred on a dry pavement in the daytime. A driver, passing a car, sneezed and the result was the injury of two persons and a

\$440 estimated property damage.

Eliminating medial exposure results in increased speed on the part of drivers who assume that high speeds are safe on this type of road, with a resulting increase in other types of accidents. Some how the message must be conveyed to drivers of cars and trucks that all safety engineered into our highways can be completely nullified by increased speeds and carelessness on the part of the drivers.

### Bulletin on Properties Of Hard-Facing Alloys

An attractive new booklet just published by Haynes Stellite Co., Kokomo, Ind., presents the physical, mechanical and chemical properties of the principal alloy products of this company, together with a brief description of each product. It contains tables showing the properties of Haynes Stellite cobalt-chromium-tungsten alloys for wear-resistance, Hastrome chromium-manganese-iron hard-facing rod, and Hastelloy alloys for resistance to chemical corrosion, and charts showing the red hardness of the three Haynes Stellite hard-facing alloys.

Copies of this booklet may be obtained from Haynes Stellite Co.

## Engineering Facts about UNION METAL Tapered Monotube Steel Piles

### 1. GREATER PILE LOADS NOW POSSIBLE

Long, tapered Monotube Steel Piles can be driven to greater depths in high load-sustaining soils, then filled with concrete, to develop load supporting values of 60 tons or more with ample factor of safety.



### 2. SUBSTRUCTURES OF ASSURED RESULTS

After driving, these sturdy, heavy gauge, Monotube Steel Piles can be inspected to the very toe before filling with concrete, giving visual proof to the engineer of the integrity and axial accuracy of the substructure he has designed.

### 3. ADAPTABLE TO VARYING CONDITIONS

Monotube Steel Piles of varying gauges, tapers and lengths are available to meet difficult and varying soil conditions. Prompt deliveries on all types.

### 4. ECONOMICAL

Easier handling, lighter field equipment, speedier driving have all contributed their share of savings to make this superior pile available to you and your client at no greater cost.

Write today for a copy of Union Metal Catalog No. 68 for complete data on Monotube Piles.

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CANTON, OHIO

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Enclosed is my remittance of \$2 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

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The guaranteed hydraulic system of Heil Dig-N-Carry Scrapers insures split-second control of every operation. Three handy levers mounted on tractor and an indicator gauge mounted on scraper provide fast, smooth, accurate cutting and spreading. Hydraulic control is only one of the many Heil advantages that help dirt-moving con-

tractors everywhere enjoy real savings in time and service expense . . . clean-cut, on-time jobs that bring repeat business. Ask your nearest Heil representative to explain all the features. Or write today for free Heil Equipment Catalog showing complete line of scrapers and dump units.



MILWAUKEE, WISCONSIN THE HEIL CO. HILLSIDE, NEW JERSEY









# Contractors and Engineers Monthly



Unloading the Osgood Invader at the Sand Pit After Having Traversed the Pavement Without Causing Any Marks Which Could Not Be Ironed Out Quickly by the Tandem Rollers.

To Speed Up the Work a Subcontractor on a North Carolina Hot-Mix Job Was Permitted to Move His  $\frac{1}{2}$ -Yard Osgood Shovel on a Trailer Over the Pavement Before Finish Rolling Was Completed.

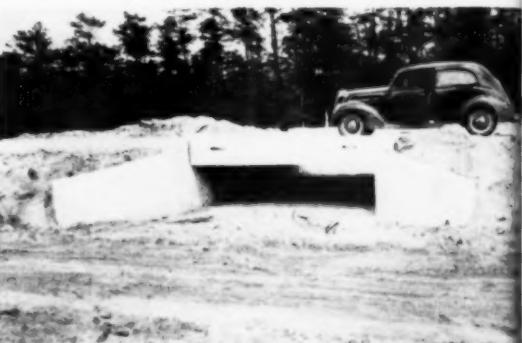
C. & E. M. Photos



Completing the Road-Mixing of the Top Course on a 2.2-Mile Open-Type Surface With a Parsons Turbo Mixer. Thomas W. Watkins & Son Was the Contractor on This New Hampshire Job. See Page 40.



Erecting the New Main Avenue High-Level Viaduct Over the Cuyahoga River at Cleveland, Ohio. E. C. Mahon Co., Contractor, Is Erecting the Steel for This \$7,000,000 Structure, Using Two Link-Belt Cranes Operating from the Ground With 130-Foot Booms Having a 20-Foot Jib Extension Giving an Overall Length of 150 Feet. Loads as Heavy as 25 Tons Have Been Handled on the 130-Foot Boom at 32-Foot Radius, and 10-Ton Loads Are Regularly Being Lifted on the Jib Boom.



C. & E. M. Photos

Typical Bridges Used in Florida in an Area Where Pipe Culverts Would Quickly Fill With Sand and Require More Cover than These Bridges With Large Openings and Shallow Depths. At Left, a Timber Farm-Access Bridge and Above, a 15-Foot Span Concrete Bridge. See Page 2.



C. & E. M. Photo

A General View from the West End of the New 5-Span Steel and Concrete Deck Bridge Built by Hobbs Peabody Const. Co. on U.S. 19 near Bryson City, N.C. See Page 1.



Adequate Facilities Are Provided for Complete Examination of All Compressed Air Workers and for the Care of All Accident Cases on the Spencer, White & Prentis Contract for Section 6, Sixth Avenue Subway, New York City. The Interior of the Clinic Near the Shaft Is Shown Above and the Exterior at the Right. See Page 2.



A-C Model Z Tractors and 7-Yard Continental Scrapers on a Kramp Const. Co. Grading Job in Wisconsin. See Page 19.

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